



Merced River Salmon Habitat Enhancement Project and Robinson Reach Phase

Initial Study/Environmental Assessment

March 5, 2001

Finding of No Significant Impact

Anadromous Fish Restoration Program Merced River Salmon Habitat Enhancement Project and Robinson Reach Phase

Lead Federal Agency:

U.S. Fish and Wildlife Service
2800 Cottage Way, Suite W-2605
Sacramento, California 95825

The U.S. Fish and Wildlife Service (Service) has proposed to partner in the funding and implementation of the four-phased Merced River Salmon Habitat Enhancement Project (project) on the Merced River between River Miles 42.1 and 44.4, Merced County, and the Robinson Reach phase of the project, which would begin in 2001.

Restoration and protection of instream and riparian habitat and isolation of predator habitat for the Merced River has been identified as a priority action in the Service's Restoration Plan for the Anadromous Fish Restoration Program (AFRP), which is authorized under section 3406(b)(1) of the Central Valley Project Improvement Act. The project would contribute to the overall AFRP goal, which is to "... implement a program that makes all reasonable efforts to ensure, that by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991." The project is further supported under the CALFED Ecosystem Restoration Plan to improve anadromous fish habitat conditions in the Merced River and throughout the Central Valley.

The first phase of the project, the Ratzlaff Reach phase was constructed in 1999 following completion of an Environmental Assessment (EA) and Finding of No Significant Impact FONSI). Because the project phases are geographically connected and are part of a coordinated effort, we determined that the project as a whole, as well as the remaining individual phases, should be evaluated for effects on fish and wildlife and their habitats. A Draft Initial Study/Environmental Assessment (IS/EA) comprising a site-specific assessment for the presently proposed Robinson Reach phase, as well as a programmatic-level assessment of potential effects associated with the overall project, was prepared and circulated to the public for a 30-day review ending February 26, 2001. Environmental effects summarized herein are detailed in the IS/EA.

Robinson Reach Phase

The IS/EA addresses three alternatives for the Robinson Reach of the project (River Mile 42.1-44.4). The first is the No Action Alternative, whereby, the Service would not participate in the Robinson Reach phase of the project, and not provide funding from the AFRP. The No Action

Alternative was not selected because it did not meet the purpose and need of the proposal. No action would allow continued incremental deterioration of spawning habitat leading to further declines in natural spawning activity, and inhibit salmonid recovery in the lower Merced River.

The second alternative is the proposed action for the Robinson Reach phase, whereby, the Service would provide AFRP funding to cost-share Robinson Reach implementation. This alternative would modify approximately 12,200 linear feet of channel to create 21,900 square yards of spawning habitat; create spawning riffles, runs, and pools; and establish a meander suitable for the current flow regime. Instream ponds would be filled or isolated to reduce salmon predator habitat and improve salmon passage through the area. The floodplain would be revegetated with native riparian plant species, thereby, increasing and enhancing overall riparian habitat in the area. Several scour channels also would be constructed, which are intended to function as seasonal wetlands. A permanent conservation easement by the State of California would protect the restored lands in perpetuity.

The third alternative is the restoration of the historic, geomorphic, and hydraulic channel conditions of the river prior to major human manipulation. This alternative would increase stream flows to simulate historic flow duration and timing, restore the historic single and braided meander within the project reach, completely fill the ponds and borrow pits and remove all setback berms which restrict the river from channel migration; expand floodplain to historic width, and encourage the capture of natural gravel through gravel augmentation and the normal floodplain hydraulic scour processes. This alternative also would have met the objectives of enhancing salmonid habitat and eliminating predator habitat, but was eliminated from consideration due to low likelihood of increased river flows, high costs when compared to the overall potential benefits, and difficulty in acquiring lands that make up the historical floodplain.

Other Project Phases

The first project phase has been completed and the two remaining phases would be designed and constructed over the next several years. The different phases are being designed sequentially using identical methodologies to ensure that each phase is compatible with the others, and that the project will function as a whole. The goal would be to create a continuous, sustainable riverine system for the entire 4.4 miles of stream that the project encompasses. Alternatives for the specific phases would be developed during phase design; these probably would be similar to alternatives described above for the Robinson Reach phase.

Ratzlaff Reach (River Mile 40-40.5)

Construction on the Ratzlaff Reach began in late June, 1999, and was completed in mid-October, 1999. The project reconstructed about 2,500 feet of river habitat into a low flow channel with a setback berm to isolate 45 acres of ponded water from the main channel. The project revegetated the berm and floodplain with native woody riparian species, and created spawning habitat with instream gravel placement. A detailed project description, alternatives, and impact analysis is documented in the EA and FONSI for the Ratzlaff phase.

Lower Western Stone Reach (River Mile 40.5-41.3)

This phase would fill instream ponds and fill or isolate adjacent ponds with setback berms. The active channel would be reconfigured, meander belts would be reconstructed, and the floodplain would be widened to accommodate bankfull flows of up to 1,700 cfs. Spawning gravel would be added and spawning beds would be reconfigured to include riffles, runs, and pools. Revegetation of native riparian plants along the floodplain and adjacent uplands would be included. Design and engineering would be completed by September, 2002. All environmental documentation, including a tiered site-specific IS/EA would be completed by December, 2002. Construction would be completed by October, 2003.

Western Stone Reach (River Mile 41.3-42.1)

Construction for this phase likely would be implemented concurrently with the Lower Western Stone Reach phase. The active channel would be reconfigured, meander belts would be reconstructed, and the floodplain would be widened to accommodate bankfull flows of up to 1,700 cfs. Spawning gravel would be added and spawning beds would be reconfigured to include riffles, runs, and pools. Revegetation of native riparian plants along the floodplain and adjacent uplands would be included. Design and engineering would be completed by September, 2002. All environmental documentation, including a tiered site-specific IS/EA would be completed by December, 2002. Construction would be completed by October, 2003.

Environmental Impacts

Robinson Reach

1. No adverse impacts to federally listed or special status species are expected, as avoidance and conservation measures have been incorporated into the proposed action. Survey results found 135 elderberry shrubs within the Robinson Reach. Elderberry shrubs are the only known host for the federally threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (VELB). Up to 47 shrubs qualifying as potential VELB habitat would be transplanted using the Service's July 9, 1999 mitigation guidelines for VELB. Additionally, impact avoidance measures for VELB have been incorporated into the project, and a biological monitor would be available, as needed.
2. The federally endangered riparian brush rabbit (*Sylvilagus bachmani riparius*) and riparian woodrat (*Neotoma fuscipes riparia*) are not likely to be present. To ensure that these species are not present, surveys would be conducted prior to construction. If surveys indicate that either of these species may be present, consultation with the Service would be initiated.
3. Temporary, minor impacts to vegetation would occur, but staging areas and access routes would be established or constructed to avoid or minimize negative affects on wetlands and native riparian vegetation. Avoidance and conservation measures have been incorporated into the proposed action to minimize the potential for adverse effects. Any incidental impacts would be mitigated by the revegetation plan, and post construction conditions would provide improved habitat for both fish and wildlife.

4. Short-term, minor impacts to wildlife are likely to occur from construction activities. However, avoidance and conservation measures have been incorporated into the proposed action to minimize temporary disturbance to fish and wildlife. Sensitive habitat features, such as trees, cavities, dens, and burrows would be avoided whenever possible. Floodplain revegetation is expected to improve wildlife habitat quality and increase wildlife habitat diversity.
5. Short-term, localized impacts are expected to occur to water quality, hydrology, and air quality during construction activities, and for a short period after construction. However, avoidance and conservation measures have been incorporated into the proposed action to minimize adverse effects. The restoration of 12,200 linear feet of river channel should enhance water temperature, river hydrology, and gravel recruitment to the benefit of anadromous fish. Creation of 21,900 square feet of salmon spawning habitat is expected to increase natural production of salmonids in the lower Merced River.
6. No adverse affects to the function and value of wetlands and floodplains are expected to occur as a result of the proposed action, pursuant to Executive Orders 11990 and 11988. After construction is complete, a mixture of approximately 49 acres of herbaceous and woody wetland types are expected to occur within the riverine classification. Due to the restoration of geomorphology and floodplain function along the Robinson Reach, the riparian habitat that would be planted and that would develop naturally is expected to more closely mimic undisturbed conditions.
7. Short-term, localized impacts to recreation are expected to occur during construction. To minimize exposure to nearby recreationists, all public safety precautions would be implemented, landowners and locals would be informed prior to construction activities, and signs would be posted near access routes.
8. Neither short- nor long-term adverse affects to human health or the environment, nor disproportionate adverse effects to low-income or minority populations are expected, pursuant to Executive Order 12898.
9. The Robinson Reach phase was determined to be a routine undertaking which has little to no potential to affect historic properties, under Appendix A of the Cultural Resources Programmatic Agreement between the Service, the California State Historic Preservation Office and the Advisory Council for Historic Preservation. Construction can proceed under the stipulation that, if any cultural resources are discovered during the project, work would halt and the Service's Regional Archaeologist shall be contacted.
10. No Indian Trust Assets were identified within the Robinson Reach. Local Native Americans have been contacted and were given the opportunity to comment on the restoration proposal.

Merced River Salmon Habitat Enhancement Project

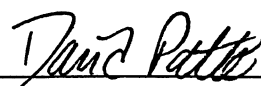
Environmental impacts associated with the Ratzlaff Reach phase of the project, completed in 2000, did not exceed those projected in that phase's EA and FONSI. Anticipated environmental impacts of the remaining project phases in Lower Western Stone and Western Stone reaches are expected to be similar to, and not exceed those, projected for the Robinson Reach phase, as described above. Impact avoidance and minimization measures developed for the Ratzlaff and Robinson Reach phases also would be implemented in these future phases, as applicable. Because the project is designed to be implemented in a phased approach over time, the expected temporary and minor adverse effects from project actions would be spread over time and not accumulate within the project area. The monitoring programs and adaptive management process established for all project phases would provide opportunity to correct unanticipated adverse conditions that could result from project actions.

In addition, the potential project benefits to fish and wildlife should outweigh any incidental, short-term adverse effects and result in a net environmental benefit. Expected benefits include enhanced spawning habitat, improved stream channel and flood plain dynamics, restored riparian vegetation consisting of native species, isolation of salmon predator habitat, and increased production of fall-run chinook salmon and steelhead in the lower Merced River. Improved gravel substrates should increase production of aquatic invertebrates and, therefore, the food base available for juvenile salmonids.

Conclusion

Based upon findings and conclusions in the IS/EA, we have determined that implementation of the Robinson Reach phase will not significantly affect the quality of the human environment. Based upon the findings and conclusions in the IS/EA, we have determined that implementation of the Merced River Salmon Habitat Enhancement Project, as a whole, will not significantly affect the quality of the human environment. Additionally, subsequent consultation with the Service and concurrence from National Marine Fisheries Service in a determination of "not likely to adversely affect" and "not likely to adversely modify", it was concluded neither action would adversely affect endangered and threatened species or adversely modify designated critical habitat.

Therefore, it is my determination that the proposal does not constitute a major Federal action significantly affecting the quality of the human environment under the meaning of section 102(2)(c) of the National Environmental Policy Act of 1969 (as amended). As such, an environmental impact statement is not required. The IS/EA prepared in support of this finding is available upon request from the U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, 2800 Cottage Way, Suite W2605, Sacramento, CA 95825; or at <http://www.delta.dfg.ca.gov/afrp/afrp.asp>



Acting Manager, California/Nevada Operations Office

3/7/01

Date

Notice of Determination

Form C

To: ☒ Office of Planning and Research
PO Box 3044, 1400 Tenth Street, Room 222
Sacramento, CA 95812-3044

☐ County Clerk
County of _____

From: (Public Agency) Cal. Dept of Fish & Game
1416 Ninth Street
Sacramento, CA 95814
(Address)

Subject:

Filing of Notice of Determination in compliance with Section 21108 or 21152 of the Public Resources Code.

Merced River Salmon Habitat Enhancement Project - Robinson Site: River Mile 42.1-44.4

Project Title

2001011128

State Clearinghouse Number
(If submitted to Clearinghouse)

Frederick A. Jurick

Lead Agency
Contact Person

916/657-4226

Area Code/Telephone/Extension

Merced River upstream from J59 bridge, 5 miles downstream from Snelling, Merced County

Project Location (include county)**Project Description:**

A complex suite of restoration actions to restore a reach of the Merced River that is degraded as a result of mining activities and recent flood impacts. Channel reconfiguration and the creation of a large floodplain with native vegetation will increase the river channel's ability to transport and deposit sediments under the river's current flow regime; hence improving channel dynamics and salmon passage concerns.

This is to advise that the California Department of Fish & Game has approved the above described project on

☒ Lead Agency ☐ Responsible Agency

3-01-01

(Date)

and has made the following determinations regarding the above described project:

1. The project ☐ will ☒ will not have a significant effect on the environment.
2. ☐ An Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA.
☒ A Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures ☒ were ☐ were not made a condition of the approval of the project.
4. A statement of Overriding Considerations ☐ was ☐ was not adopted for this project.
5. Findings ☒ were ☐ were not made pursuant to the provisions of CEQA.

This is to certify that the final EIR with comments and responses and record of project approval is available to the General Public at:
CDFG, 1416 Ninth St, Sacramento, CA 916/657-4226 www.delta.dfg.ca.gov/afpr

Frederick A. Jurick
Signature (Public Agency)

3/2/01
Date

Environmental Specialist
Title

Date received for filing at OPR:

RECEIVED

MAR 02 2001

STATE CLEARINGHOUSE

Revised May 1999

NEGATIVE DECLARATION

PROJECT TITLE

Merced River salmon habitat enhancement, Robinson site at River mile 42.1 to 44.4.

PROJECT LOCATION

The project is located along the Merced River; about five miles southwest of the town of Snelling; approximately two miles upstream and including the Highway 59 bridge; Merced County, California. Sections 26 and 27 of the Township 5 South, Range 13 East, MDB&M, Winton 7.5 minute USGS quadrangle map. Access and construction through ANP No. 042-220-08, APN No. 042-230-26, and APN No. 043-070-39 Merced County.

PROJECT DESCRIPTION

The Robinson Reach Project will include a very complex suite of restoration actions to restore a reach of the Merced River that is degraded as a result of mining activities and more recent flood impacts. Channel reconfiguration and the creation of a large floodplain with native vegetation will increase the river channel's ability to transport and deposit sediment under the river's current flow regime; hence, improving channel dynamics and salmon passage concerns. These actions within the channel should produce improvements for salmon spawning and rearing through creation of a defined passage channel for both adults and juveniles, spawning riffles, runs, pools, and improved water quality.

Proposed construction will modify approximately 12,200 feet of channel, creating 21,900 yds² of chinook salmon spawning habitat which incorporates spawning riffles, runs, and pools, and a meander that has been engineered to fit the river's current flow regime. Approximately 64.9 acres of salmonid predator (nonnative warmwater species) habitat will be removed by filling instream ponds, creating and expanding the available floodplain. Existing and created floodplain will be enhanced and revegetated with native riparian plant species, increasing the available riparian habitat in the area. Several scour channels will also be constructed, which are intended to act as seasonal wetlands. An estimated 1 million tons of on-site material will be manipulated during construction. Construction in this reach will require two full summer seasons. Construction is scheduled to begin in May 2001 and will likely run through to September 2001. Construction will resume in May 2002, and will be completed in September 2002. Long term maintenance and monitoring of the project will be conducted.

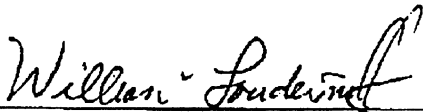
Other information regarding this specific project, the area immediately adjacent to the project site, and two future habitat enhancement activities (Lower Western Stone and Western Stone) associated with this proposed project can be found in the attached Merced River Salmon Habitat Enhancement Project Programmatic CEQA Environmental Checklist and NEPA Initial Study/Environmental Assessment. The Lower Western Stone and Western Stone project sites are still in the preliminary design phase and future environmental documents specific to these projects will address any cumulative effects which may be anticipated due to finalized design changes.

FINDINGS

The Department of Fish and Game, in partnership with the Department of Water Resources and the U.S. Fish and Wildlife Service, has prepared a Programmatic Initial Study/Environmental Assessment which includes this specific project in conjunction with other chinook salmon habitat enhancement efforts planned for this section of the Merced River. Department of Fish and Game has concluded that a Negative Declaration should be prepared for the Robinson reach portion (Merced River mile 42.1-44.4) of the project. The Negative Declaration, inclusive of the Environmental Assessment, is herein presented to the State Clearinghouse, Office of Planning and Research for circulation. The Negative Declaration and Initial Study concludes that no significant impacts will occur. The project does not have the potential for any significant adverse effect, either individually or cumulatively, on water quality or environmental resources. Precautionary measures to avoid the taking of any Federally or California-listed Threatened or Endangered (T&E) species have been incorporated into the project.

Therefore, this Negative Declaration is filed pursuant to Section 15070 et seq. Of the California Code of Regulations (CEQA Guidelines) for Implementation of the California Environmental Quality Act. The public review period for this proposed Negative Declaration and environmental documents will end February 28, 2001. Information relating to the proposed project is on file at the Department of Fish and Game address below. Any person wishing to examine or obtain a copy of the information or this document may do so by inquiring at said office during regular business hours:

Frederick A. Jurick
Environmental Specialist III
California Department of Fish and Game
Central Valley Bay-Delta Branch
1416 Ninth Street
Sacramento, California 95814


William Loudermilk, Regional Manager
San Joaquin Valley and Southern Sierra Region
California Department of Fish and Game

1/30/01
Date

Merced River Salmon Habitat Enhancement Project
and
Robinson Reach Phase

Initial Study/Environmental Assessment

March 7, 2001

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1.0 INTRODUCTION

This joint Initial Study and Environmental Assessment (IS/EA) for the Merced River Salmon Habitat Enhancement Project (project) has been prepared to satisfy the requirements of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). This is a joint California Department of Fish and Game (CDFG), California Department of Water Resources (DWR) and U.S. Fish and Wildlife Service (Service) project. CDFG is the lead CEQA agency and the Service is the lead NEPA agency.

The purpose of this IS/EA is to assess the environmental effects of implementing the Merced River Salmon Habitat Enhancement Project (project). The project consists of four phases, each covering one of four connected reaches of the river (hereafter, the term “project” refers to the overall Merced River Salmon Habitat Enhancement Project, and “phase” refers to an individual component of the project, named for the corresponding river reach). While each phase of the project could be viewed as a separate project, the four phases need to be considered programmatically as a whole. The IS/EA provides a summary project description for the overall project and a programmatic impacts analysis covering all four phases. The programmatic analysis is broad in scope and emphasizes potential accumulation of impacts due to multiple actions. This IS/EA also includes a more-detailed and narrowly focused analysis for the proposed Robinson Reach Phase. Specific projects within other phases may require further site-specific NEPA/CEQA documentation prior to their implementation.

This IS/EA will disclose the following, if applicable: impacts that are determined to be significant; potentially significant, incremental, and growth-inducing impacts; mitigation measures that would reduce potentially significant impacts to less than significant levels; and potentially significant environmental effects resultant of the project that cannot be avoided. Appendix A contains the Initial Study Checklist.

1.1 Purpose and Need

The project purpose is to assist in an overall effort of improving anadromous fish passage and survival rates within the lower reaches of the Merced River. Restoration and protection of instream and riparian habitat and isolation of predator habitat for the Merced River has been identified as a priority action in the Service’s Restoration Plan (USFWS 2001) for the Anadromous Fish Restoration Program (AFRP), which is authorized under section 3406(b)(1) of the Central Valley Project Improvement Act (CVPIA). The project would contribute to the overall AFRP goal, which is to “... implement a program that makes all reasonable efforts to ensure, that by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991.” The project is further supported under the CALFED Bay-Delta Program’s (CALFED) Ecosystem Restoration Plan to improve anadromous fish habitat conditions in the Merced River and throughout the Central Valley.

The project is needed to improve the current river regime, which is highly degraded in the area defined as the Merced River Salmon Enhancement Project, and contains poor spawning and rearing conditions for salmon. Some of the problems include a degraded channel, poor gravel composition, low flows, high water temperatures, low intragravel oxygen content, predation on out-migrating juvenile salmon by warm water fish such as large and smallmouth bass, and insufficient suitable spawning habitat (CDFG, November 1993; CDFG Memo September 6, 1991; CDFG Memo November 23, 1987).

1.2 Project Setting

The Merced River flows west from the Sierra Nevada to the San Joaquin River draining a large watershed, approximately 1,273 square miles in size. The confluence of the Merced and San Joaquin Rivers occurs at river mile 118 of the San Joaquin River. The headwaters of the Merced River are located in Yosemite National Park, at an elevation of about 10,000 feet and the area of confluence with the San Joaquin River is at an elevation of about 60 feet. The Merced River is accessible to anadromous fish for the first 51 river miles, with access terminating at Crocker-Huffman Dam.

The Project Area comprises the Ratzlaff, Lower Western Stone, Western Stone, and Robinson Reaches (Fig. 1 and 2), and is located on the eastern side of the San Joaquin Valley in Merced County, approximately 4 miles downstream from the town of Snelling. This area is characterized by low gradient stream patterns and abandoned floodplain terraces. The area adjacent to the Project Area has been developed for agricultural uses, such as row crops, cattle grazing, and orchard crops. Removal of riparian vegetation to facilitate these agricultural practices has resulted in only a narrow strip of riparian vegetation occurring along the incised river channel. The riparian habitat and floodplain have been further disturbed by intensive aggregate mining. In the Project Area vicinity, the Merced River is altered and degraded by water diversions, instream flow limitations, water quality changes, and road encroachment.

The entire Project Area is characterized by several gravel pits that were excavated within the last 40 years. These pits were excavated to an approximate depth of 15-20 feet, which is about 10 feet below the current water level in some areas. The berms that separated the river and gravel pits have degraded over the years to become low islands along the river channel. In some areas, the river has captured the gravel pits and flows through them, and in other instances the channel has become highly braided and lacks characteristics of a defined channel. The cumulative result of these alterations is a highly disturbed river segment whose capacity to support populations of anadromous fish and other riparian dependant species is greatly diminished.

2.0 MERCED RIVER SALMON HABITAT ENHANCEMENT PROJECT

The Merced River Salmon Habitat Enhancement Project targets the Merced River floodplain between river miles 40.0 and 44.4 for intensive restoration. Funding sources include DWR

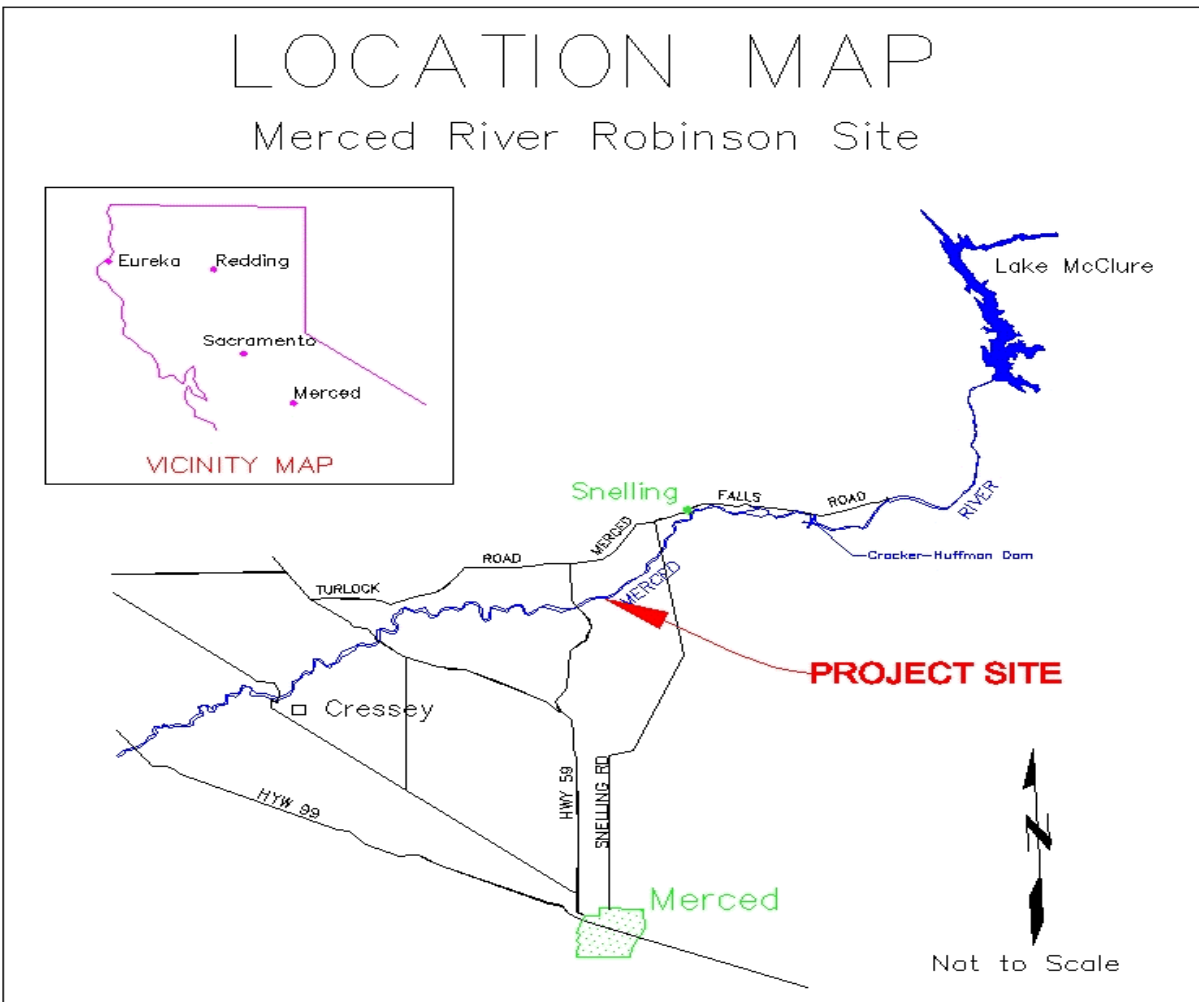
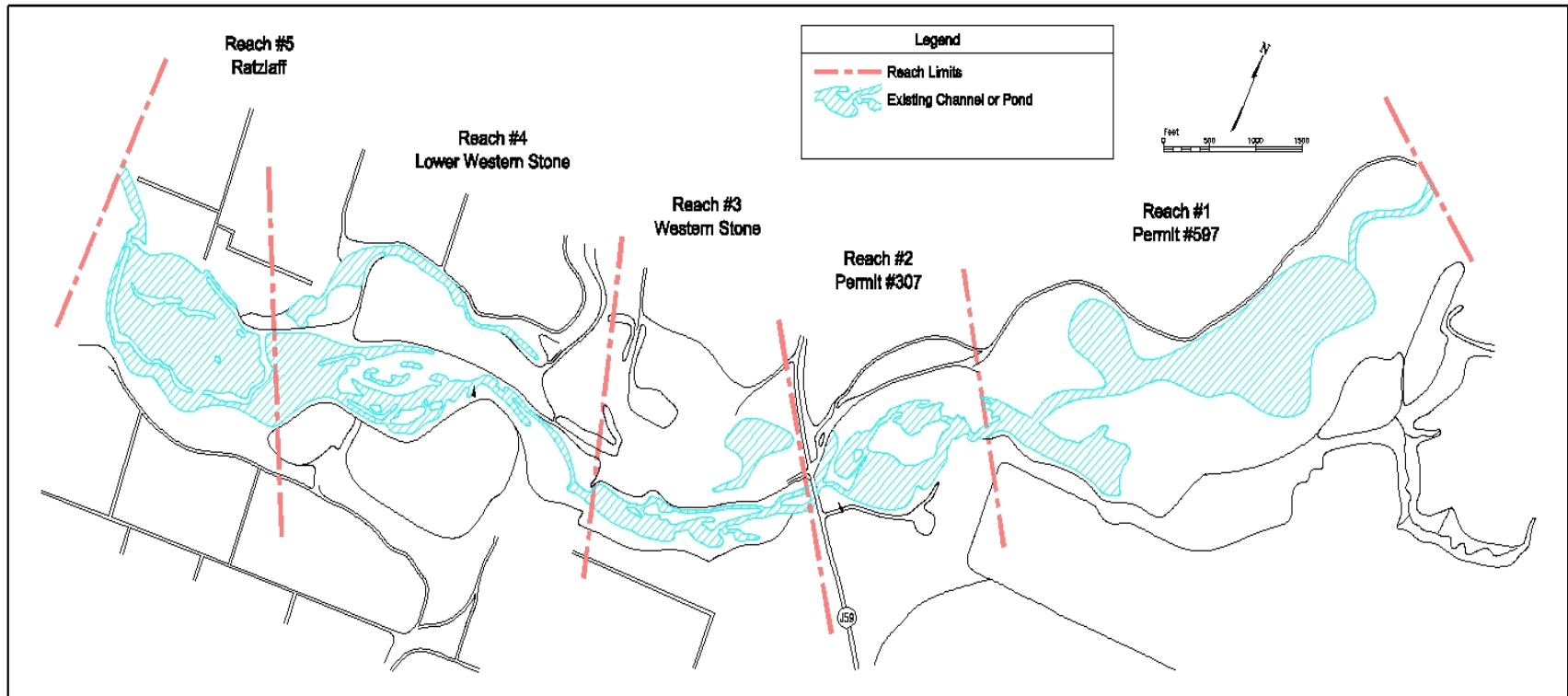


Figure 1. Project Location Map.

(Delta Pumping Plant Fish Protection Agreement funds), AFRP, U.S. Bureau of Reclamation and CDFG (Tracy Fish Facility Direct Loss Mitigation Program funds), and CALFED.

The proposed project would: isolate or eliminate habitat for non-native predators of juvenile salmon; increase the quantity and quality of spawning habitat for chinook salmon and steelhead; increase the quantity and quality of rearing habitat for chinook salmon and steelhead; improve anadromous fish passage; improve river and floodplain dynamics by reconfiguring the channel to better conform with the present flow regime; create and enhance the riparian corridor; create a functional stream segment; and create and sustain more habitat for plant and wildlife species that are dependent upon the riparian community.

Figure 2. Project Reach Locations. Reaches 1 and 2 compose the Robinson Reach.



The Project will be designed and constructed in several phases over several years. The different phases will be designed using identical methodologies to ensure that each phase is compatible and functions as a whole. The goal is to have a continuous, sustainable riverine system for the entire 4.4 miles that the Project encompasses.

Specific issues addressed by the Project will vary within each reach, depending upon the severity and type of disturbance that exists in each area. The Project area is divided into 4 reaches: Ratzlaff Reach (river miles 40-40.5), Lower Western Stone Reach (river miles 40.5-41.3), Western Stone (river miles 41.3-42.1), and Robinson Reach (river miles 42.1-44.4). Some or all of the following actions may be included during project phases:

- unnatural instream ponds will be filled and deepwater pools adjacent to the active channel will either be filled or isolated with setback berms;
- spawning gravel will be added and spawning beds reconfigured to include riffles, runs and pools;
- the active channel will be reconfigured to conform with the present flow regime by reconstructing meander belts and a widened floodplain; native riparian and seasonally inundated vegetation will be used to revegetate the floodplain and river corridor surfaces;
- project goals and values will be maintained through land conservation agreements coupled with monitoring plans and adaptive management.

3.0 ROBINSON REACH PHASE

3.1 Assumptions for Alternatives Development

Basic assumptions that influenced the development of the proposed project include:

- Merced Irrigation District (MID) directly controls flows in the lower Merced River via releases from Lake McClure. Flows are further regulated by McSwain Dam, Merced Falls Dam and Crocker-Huffman Dam, all located downstream of Lake McClure. Supplemental flows may be purchased from willing sellers in addition to those required by the New Exchequer Dam project FERC license and the Davis-Grunsky contract settlement agreement.
- The habitat restoration actions were selected by consensus among representatives of MID, DWR, CDFG and the Service based on the following:
 - A) Existing conditions, e.g., inadequate river channel and floodplain dynamics, poor water quality and high water temperatures, and predation on juvenile salmon by warmwater fish;
 - B) Related restoration plans: Robinson Reach is within a 4.4-mile section of the Merced River identified as a potential restoration effort known as the Merced River Salmon Habitat Enhancement Project. Implementation of the entire

project would have the greatest potential for non-flow related improvement in chinook salmon production;

C) Physical access: equipment entrance to the site would have minimal impacts to the stream corridor, riparian vegetation and any sensitive habitat; and

D) Willing and active landowner participation.

The proposed Robinson Reach phase incorporates actions that consider funding availability and participating landowner interests to meet as many of the above project assumptions as possible. Wherever possible or feasible, environmental easements or land use agreements will be obtained from participating adjacent landowners. A further discussion of the Robinson reach phase is included in section 2.0.

3.2 Proposed Action

The Robinson Reach (River Mile 42.1-44.4) is the largest reach included in this project, spanning over 2 miles in length. This reach was initially divided into 2 separate reaches (Permit #307 and Robinson Ranch), but has since been merged together and will be collectively referred to as the Robinson Reach. These two reaches were joined into one reach because it was more economically and logistically feasible for construction and planning to cover this entire area simultaneously. This reach has several gravel pits that provide habitat for non-native warm water fishes, a highly braided channel and several abandoned channels, and exhibits sheet flow in areas that lack a defined channel. The lack of a defined channel made it necessary for CDFG to cut an emergency channel through the area to allow for Fall-run chinook salmon passage.

Subsequent completion of a permanent conservation easement by the State of California (Appendix M), approximately 12,200 feet of channel will be modified to create 21,900 square yards of spawning habitat; incorporate spawning riffles, runs, and pools; and establish a meander that fits the current flow regime. Approximately 64.9 acres of salmonid predator habitat will be removed by filling instream ponds. The floodplain would be enhanced and revegetated with native riparian plant species, increasing the available riparian habitat in the area. Several scour channels will also be constructed, which are intended to function as seasonal wetlands. An estimated 1 million tons of on-site material will be manipulated during construction. Construction in this reach will require two full summer seasons. Construction would begin in May 2001 and likely run through September 2001, and resume in May 2002 to be completed in September 2002.

An additional component of the project will be a monitoring program that will comply with AFRP policy of monitoring AFRP funded projects, and that will assist the AFRP in evaluating the long-term benefits of such projects to anadromous fish resources. Monitoring will consist of multi-year programs to measure passage by juvenile salmon through the project reaches, use of restored riffles by spawning adults, changes in water temperature, increase of various aquatic habitat types, alterations in channel morphology, and increase of vegetation along the

channel and on the floodplain. Appendix D contains details of the fish monitoring plan and appendix E contains details of the geomorphic monitoring plan.

The revegetation project will start soon after channel construction; monitoring and maintenance will last for 5 years, stipulated by the Plant Replacement Criteria in the U.S. Army Corps of Engineers 404 Permit. Appendix C details the revegetation plan and Appendix F details the revegetation monitoring plan.

3.3 Alternatives Eliminated from Further Consideration

One alternative is the restoration of the historic, geomorphic, and hydraulic channel conditions of the river prior to major human manipulation. This alternative would: increase stream flows to simulate historic flow duration and timing; restore the historic single and braided meander within the project reach; completely fill the ponds and borrow pits and remove all setback berms which restrict the river from channel migration; expand floodplain to historic width; and encourage the capture of natural gravel through gravel augmentation and the normal floodplain hydraulic scour processes.

Restoring historic conditions would allow floodwaters to be redistributed across a wide, shallow floodplain and encourage lateral channel migration through a more natural scour and deposition process. The riparian corridor would be enhanced and maintained through the seasonal, shallow water conditions. Riparian and aquatic habitat would be greatly improved and potentially stabilized to a degree that reflects a more historically natural channel/corridor hydrodynamics. The gravel augmentation program would include instream placement of the appropriately sized gravel to be mobilized under high flow conditions as well as normal stream migration and scour of available floodplain resources.

This alternative also would have met the objectives of enhancing salmonid habitat and eliminating predator habitat. However, this alternative was eliminated from consideration due to several variables including: low likelihood of increased river flows; the high cost to benefit of completely filling all of the ponded gravel pits to allow expansion of the floodplain to its historic condition; and acquiring the lands that made up the historical floodplain would be difficult since much of the floodplain is currently farmed and is held by a number of different landowners.

3.4 No Action Alternative

The No Action alternative would consist of no funding for restoration activities. No restoration or construction activities would take place and there would be no change to the existing conditions. Other impacts of the No Action Alternative would depend on the level of activities occurring within the corridor of the river, which would include construction and maintenance activities.

4.0 RELATED ACTIONS

4.1 Ratzlaff Reach Phase (River Mile 40-40.5)

Construction on the Ratzlaff Reach began on June 21, 1999, and was completed in mid-October 1999. A summary of the Ratzlaff Reach phase can be found in the Cumulative Actions section (section 4.0) portion of the document. A detailed project description, alternatives, and impact analysis can be found in the Environmental Assessment for the Ratzlaff phase (USFWS 2000).

4.2 Lower Western Stone Reach Phase (River Mile 40.5-41.3)

This future phase would have the design and engineering finalized by September 2002, all environmental documentation (including a tiered site-specific IS/EA) and permitting finalized by December 2002, and construction completed by October 2003. Ongoing revegetation and monitoring would continue after construction. This phase will consist of filling instream ponds and isolating or filling adjacent ponds with setback berms. The project will add spawning gravel and reconfigure spawning beds to include riffles, runs and pools. The active channel would be reconfigured, meander belts would be reconstructed, and the floodplain would be widened to accommodate bankfull flows of up to 1,700 cubic feet/second (cfs). Revegetation of native riparian plants along the floodplain and adjacent uplands also will be a part of this phase.

4.3 Western Stone Reach Phase (River Mile 41.3-42.1)

Construction within this future reach would likely be implemented concurrently with the Lower Western Stone Reach. This phase would consist of filling instream ponds and isolating or filling adjacent ponds with setback berms. The project would add spawning gravel and reconfigure spawning beds to include riffles, runs and pools. The active channel would be reconfigured, meander belts would be reconstructed, and the floodplain would be widened to accommodate bankfull flows of up to 1,700 cfs. The project also would avoid negative impacts to special status species and develop physical and biological monitoring plans. Revegetation of native riparian plants along the floodplain and adjacent uplands also would be a part of this project phase.

4.4 Monitoring

Monitoring would be included in the project description of the Lower and Western Stone Reaches. These monitoring programs would comply with AFRP policy requiring monitoring of funded projects and to assist the AFRP to evaluate the long-term benefits of such projects to anadromous fish resources. Monitoring will consist of multi-year programs to measure passage by juvenile salmon through the project reaches, use of restored riffles by spawning adults, changes in water temperature, increase of various aquatic habitat types, alterations in channel morphology, and increase of vegetation along the channel and on the floodplain.

5.0 REQUIRED PERMITS AND APPROVALS

All project phases identified in this document are individually subject to public review as required by CEQA and NEPA. Each phase also will comply with threatened and endangered species recovery requirements in compliance with both CESA and ESA recovery goals. The following permits and authorizations are required to implement the proposed Robinson Reach phase:

Section 404 of the Clean Water Act. The U.S. Army Corps of Engineers (ACOE) is authorized to issue permits for discharges of dredged or fill material into waters of the United States.

Section 401 of the Clean Water Act. State water quality standards can not be violated by the discharge of fill or dredged material into waters of the U.S. The State Water Quality Control Board, through the Central Valley Regional Water Quality Control Board (CVRWQCB), is responsible for issuing water quality certifications, or waivers thereof, pursuant to Section 401 of the Clean Water Act.

National Pollutant Discharge Elimination System Permit. The CVRWQCB regulate point source and non-point source discharges through the National Pollutant Discharge Elimination System (NPDES). NPDES permits are required for storm water discharges from construction sites involving more than five acres or containing a hazardous substance in excess of reportable quantities established by the Environmental Protection Agency (EPA).

Aboveground Petroleum Storage Act with 1991 Amendments. A state law requiring owners and operators of aboveground petroleum storage tank facilities with a single tank capacity greater than 660 gallons, or with a cumulative storage capacity of greater than 1,320 gallons, to file a storage statement with the State Water Resources Control Board.

Executive Order 11990 (Protection of Wetlands). Federal agencies are required to follow avoidance, mitigation, and preservation procedures with public input before proposing new construction in wetlands. To comply with Executive Order 11990, the federal agency will coordinate with the ACOE under section 404 of the Clean Water Act, and shall incorporate appropriate mitigation measures for impacts to wetland habitats.

Executive Order 11988 (Floodplain Management). All federal agencies are required to take actions to reduce the risk of flood loss, restore and preserve the natural and beneficial values in floodplains, and minimize the impacts of floods on human safety, health, and welfare.

Federal Endangered Species Act (ESA). Section 7 of the ESA requires all federal agencies, in consultation with the Service and National Marine Fisheries Service (NMFS), to ensure that their actions do not jeopardize the continued existence of endangered or threatened species or result in the destruction or modification of the critical habitat of these species.

California Endangered Species Act (CESA). California Fish and Game Code requires any state agency, board, or commission acting as the lead agency under CEQA to conserve threatened and endangered species during development of project through consultation with the CDFG.

Section 106 of the National Historic Preservation Act. Projects must coordinate with the State Historic Preservation Office and the Advisory Council on Historic Preservation regarding the effects that a project may have on properties listed, or eligible for listing, on the National Register of Historic Places.

Reclamation Board Encroachment Permit. The Reclamation Board issues permits to maintain the integrity and safety of flood control project levees and floodways that were constructed according to flood control plans adopted by the Board of the State Legislature.

Streambed Alteration Agreement, Section 1601. Section 1601 of the California State Fish and Game code requires a state or local governmental agency or public utility to notify the CDFG before it begins a construction project that may impact the bed, channel, or bank of any river, stream or lake.

Executive Order 12898 (Environmental Justice). Requires Federal actions to address Environmental Justice in minority and low-income populations. Environmental Justice analyses are required to identify potential disproportionately high and adverse impacts from proposed actions and to identify alternatives that might mitigate these impacts.

Migratory Bird Treaty Act. This law enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and the Soviet Union, and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. The act protects migratory birds, their occupied nests, and their eggs.

In addition to these permits and approvals, further consultation and coordination with State and Federal agencies will also be required. These requirements are described in section 5.0 of this document.

6.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

6.1 Surface Water and Hydrology

6.1.1 Affected Environment

The Merced River has undergone extensive modification over the years to provide agricultural and municipal water supply, flood control, and power generation, as well as raw materials

such as gravel products and gold. As early as the 1870's, large canal systems were built to divert Merced River water for agricultural uses. Several dams were built to regulate flows, the largest being New Exchequer Dam (completed in 1967), which can store up to 1,032,000 acre-feet of water in its reservoir. Mining for gold and aggregate downstream of the dams has been extensive, leaving tailings and numerous pits within the river corridor.

The manipulation of the river has led to loss and degradation of native habitat. With the building of dams, access to spawning grounds upstream has been lost, and gravel recruitment is greatly reduced in reaches below the dams. The large in-stream ponds left by mining have created marginal salmon habitat, which is favorable for introduced warmwater fish species that prey upon juvenile salmon. In an effort to better understand those problems influencing salmon production in the Merced River, CDFG biologists have identified several factors, which together, seem to have contributed to the decline of San Joaquin fall-run chinook salmon. Among those identified factors are degraded channel, poor gravel composition, low flows, high water temperatures, low intragravel oxygen content, predation on out migrating juvenile salmon by warmwater fish such as large and smallmouth bass, and insufficient suitable spawning habitat (CDFG, November 1993; CDFG Memo September 6, 1991; CDFG Memo November 23, 1987). Specific to the Robinson Reach phase site, CDFG biologists estimate that during the spawning seasons of 1995 and 1996, 15-25% of the annual Merced River natural salmon spawning and production occurred in the Robinson reach (B. Loudermilk, personal communication). Upstream of the project site, near the Crocker-Huffman Dam, the majority of the river's natural spawning occurs. This means that a significant portion of the Merced River annual production of natural out-migrating salmon juveniles must successfully negotiate this four-mile segment of disturbed and dysfunctional river. In addition, much of the productive spawning and rearing qualities of the project site have been lost, which would otherwise support some of this upstream production.

Flow regulation has lead to reduced peak flows and an overall reduction in the average flow in the river. The two-year flow event before dam construction (pre-Exchequer Dam) was approximately 16,000 cfs (Exchequer gage). Flow records show that since New Exchequer Dam began operation, the two-year event is approximately 2,300 cfs (Snelling gage). This means that the high flows, which traditionally scoured and flushed vegetation from active gravel bars and banks and delivered coarse sediment, are all but absent. As a result there is encroachment of vegetation, which leads to narrowing and armoring of the channel and can result in channel downcutting that further disassociates the channel from its floodplain (Vick 1995).

A loss of gravel recruitment to the lower reaches of the river also is attributed to dams. The river is "sediment starved" and during higher flows tends to recruit sediment from channel banks and beds. In the absence of sufficient gravel recruitment the channel scours and degrades, which when combined with reduced flow, can further narrow the channel and lead to the loss of active floodplains. Prior to the January 1997 flood event, the reach of Merced

River between the Highway 59 bridge and Snelling (within which the Robinson reach falls) had shown little evidence of degradation, although reaches both upstream and downstream of it appeared to be degrading (Vick, 1995). During the 1997 event the berms that had confined the river to the historic channel in the project reach (RM 42.1 to 44.4) were breached, and the river abandoned its channel in favor of a gravel pit with an invert approximately six feet lower. This abandonment of the channel resulted in the loss of several prime salmon spawning riffles and valuable nursery habitat. It created habitat for salmon predators which favor slow moving warm water, created a seasonal passage problem for adult salmon spawners, hindered out-migrating juvenile salmon passage, and reduced smolt survival.

The Robinson reach consisted of a narrow channel confined by levees with in-stream ponds and no floodplain, prior to the 1997 flood event. With the 1997 flood event came several major changes to the geomorphic characteristics of the reach. For much of the length, the river now travels through a wide, flat area, which lacks a defined channel or adequate gravel, and then into a series of ponds. Not only is this situation geomorphologically dysfunctional, it provides many barriers to both juvenile and adult salmon survival. The wide, flat, shallow area subjects smolt to possible stranding during flow fluctuation and increases their vulnerability to avian predators. During low summer/fall flows, the wide, flat, shallow area provides a passage problem for adults returning to upstream spawning areas (during the September of 1997, CDFG was forced to dig a temporary channel through part of the Robinson reach site to facilitate a safer fish passage past the site). The in-stream ponds provide habitat for predatory fish. The ponds also serve to increase water temperatures, particularly under low flow conditions.

The river now flows through these warm ponds of slow moving water which are ideal habitat for large and smallmouth bass (*Micropterus salmoides* and *Micropterus dolomieu*) and other predators of juvenile salmon. An earlier pilot study which, investigated predation of juvenile salmon in similar ponded portions on the Tuolumne River, indicated that small and largemouth bass were a predator of juvenile chinook salmon (EA Engineering, September 1990). More recently, conclusions drawn from a radio tagged salmon smolt recovery study conducted in 1998 on the Stanislaus River (D. Demko, personal communications) support the earlier Tuolumne River studies which document substantial salmon smolt predation by bass species. Anecdotal information further indicates the well accepted belief that most instream ponded areas within the Stanislaus, Tuolumne, and Merced Rivers provide excellent bass fishing. This information strongly suggests that a significant salmon predator relationship exists in all captured mining pits throughout the east-side San Joaquin basin tributaries. The juvenile salmon migrating downstream become disoriented in the slow moving waters of the pond and become extremely vulnerable to predation by bass and other potential predators. It is reasonable to assume that juvenile salmon transiting through these warm water ponds are less likely to survive than salmon smolts out-migrating in faster moving, cool river water. It is also logical to expect that the ponds serve as reproduction and rearing areas for salmon predators, which migrate from these areas and recharge the entire river system.

6.1.2 Criteria for Determining Significance

Impacts to surface water would be considered significant if they result in increased base flood elevations upstream and downstream of the project area by greater than 1 foot.

6.1.3 Environmental Consequences

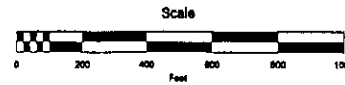
6.1.3.1 No Action Alternative

Without the proposed Robinson reach phase and under existing conditions, water quality and hydrologic processes would continue as they are now. Stream flow strongly influences chinook salmon in the Merced River. Low flows can lead to poor water quality, which can delay spawning, decrease egg survival and cause high juvenile mortality during the spring emigration period. Results of stream temperature modeling studies on the lower Merced River indicate that in recent years, temperature limits for salmon spawning were commonly exceeded in portions of the reach in October. This contributed to delayed upstream migration and spawning. In recent drought years, returning adults were first observed in the lower Merced River in early November, rather than October as in previous years, because high water temperatures blocked their upstream migration.

As with the other San Joaquin basin tributaries, high water temperatures on the Merced River during the spring emigration period may be a significant factor affecting smolt survival. Results of stream temperature modeling studies indicate that in May and at times in late April, smolts emigrating from the Merced River encounter stressful or lethal water temperatures. Temperature was a consideration in formulating the FERC and AFRP revised flow schedules. However, these new schedules are not expected to significantly ease temperature problems under all ambient conditions, especially in the lower portion of the river during low flows.

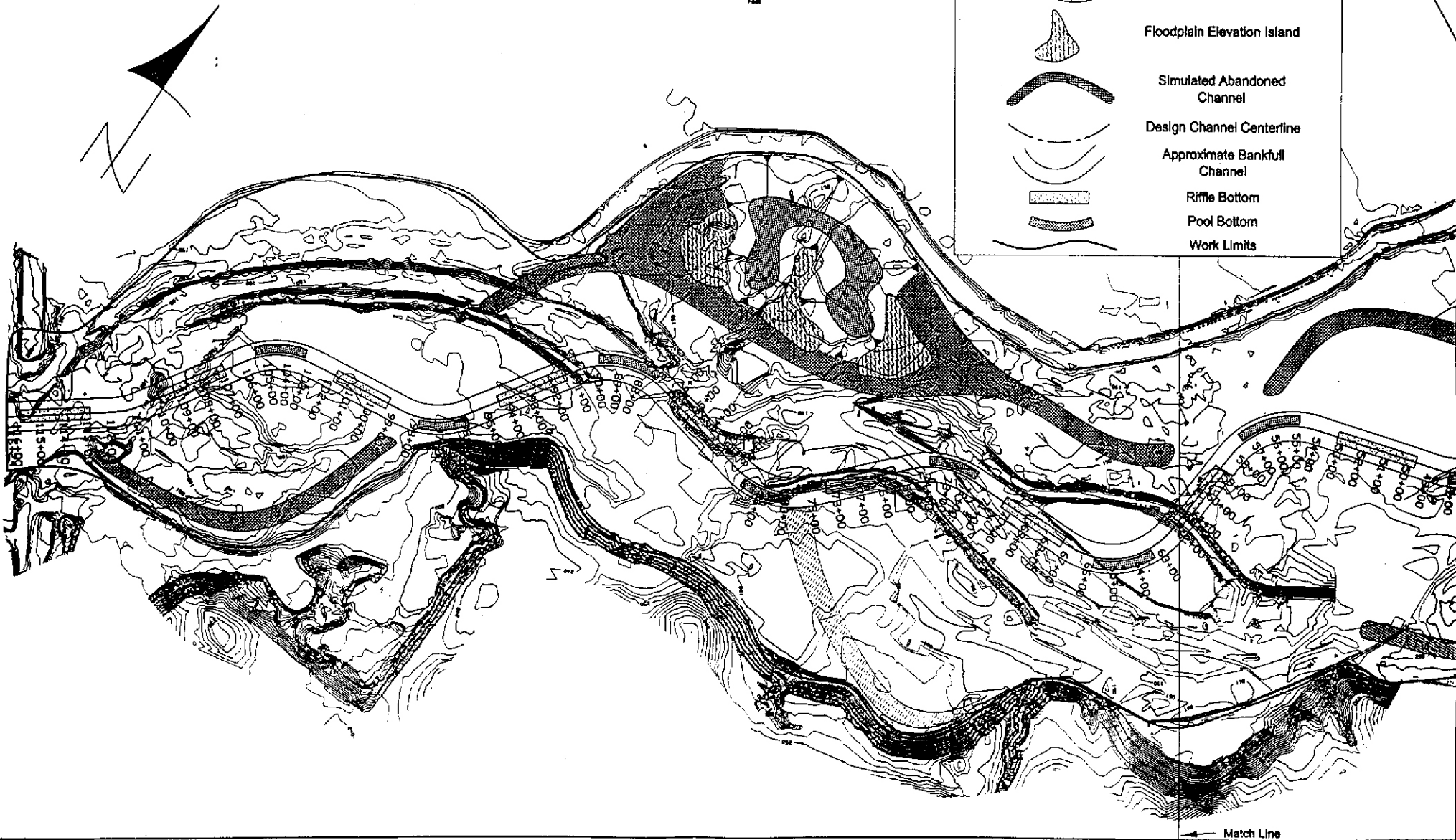
6.1.3.2 Proposed Robinson Reach Phase

The proposed Robinson reach phase (Fig. 3 and 4) will scale the channel to fit the post-dam flow regime, which favored salmonid species. Over the entire reach, the channel will be reshaped to include spawning riffles, runs, and pools, which would provide spawning and rearing habitat for salmon and other native species. The bermless river channel would allow the river to flood the floodplain, thus creating shallow water habitat for fish and wildlife. The isolation of deep pools would isolate these deep water areas from the main channel and would reduce predation on native fishes by non-native warmwater fishes. Sheet flow would be eliminated and would also improve fish passage and would reduce stranding. The replanted floodplain will also provide habitat for terrestrial species, and will also help to stabilize the river channel and would minimize damage during high flows. Avoidance and conservation measures for hydrology and stream channel, as outlined in Appendix J, will be followed during construction.




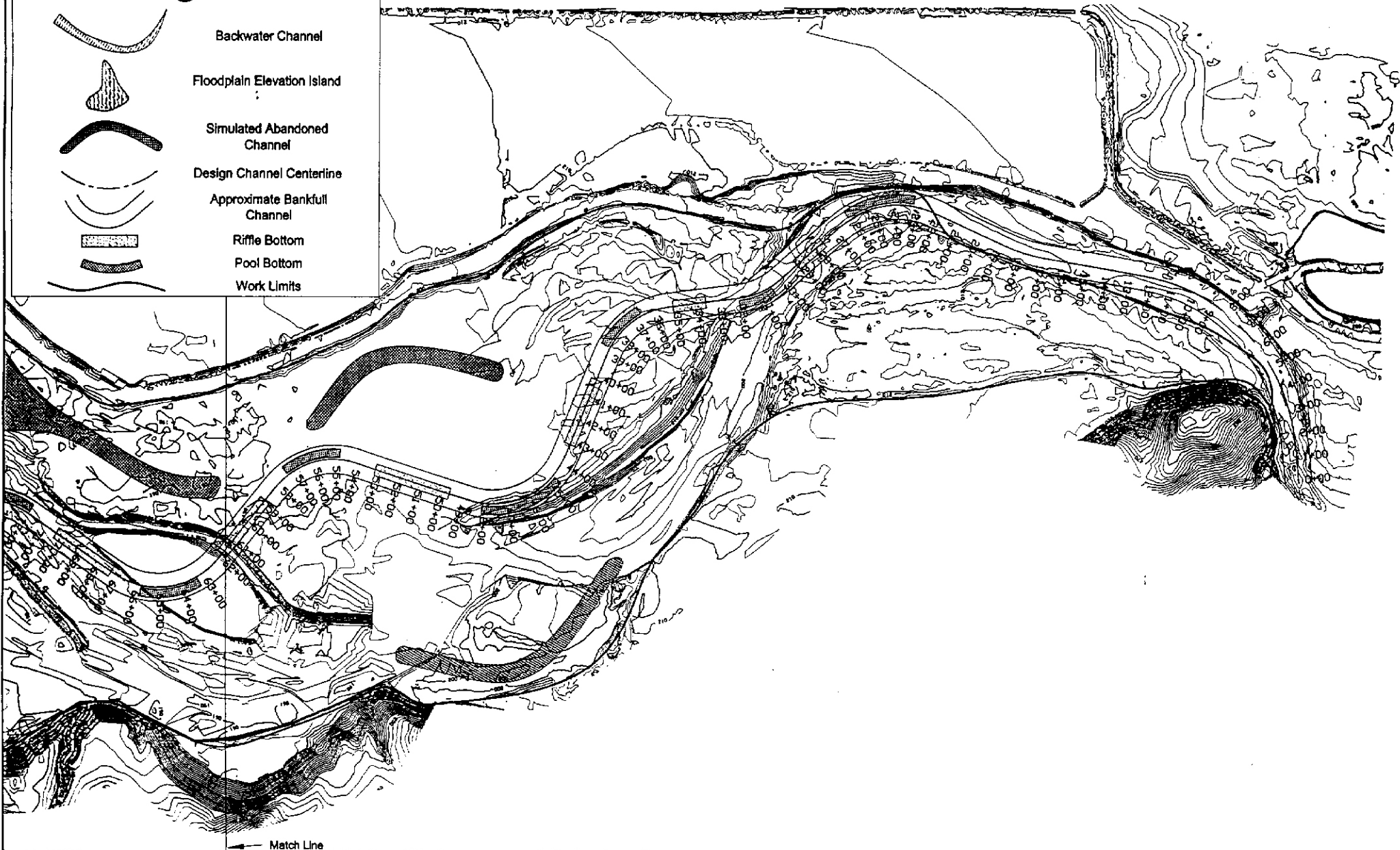
Legend

-
- Backwater Channel
 - Floodplain Elevation Island
 - Simulated Abandoned Channel
 - Design Channel Centerline
 - Approximate Bankfull Channel
 - Riffle Bottom
 - Pool Bottom
 - Work Limits



Legend

- 
- Backwater Channel
 - Floodplain Elevation Island
 - Simulated Abandoned Channel
 - Design Channel Centerline
 - Approximate Bankfull Channel
 - Riffle Bottom
 - Pool Bottom
 - Work Limits



6.1.3.3 Related Actions

The Lower and Western Stone Reaches will also modify the river channel to create spawning riffles, runs, and pools, which would create more spawning and rearing habitat for salmon. In deep pools would be isolated from the river, helping to reduce predation. A bermless design would also be used to allow the river to flow across the floodplain during higher flows. Avoidance and conservation measures for hydrology and stream channel, as outlined in Appendix J, will be followed during construction.

6.2 Water Quality

6.2.1 Affected Environment

The project area comprising all four phases between McSwain Reservoir and the San Joaquin River, where the Merced River has the following beneficial uses: agricultural supply; cold freshwater habitat; industrial service supply; migration of aquatic organisms; municipal and domestic supply; hydropower generation; industrial process supply; contact and non-contact water recreation; spawning, reproduction, and early development for fish; warm freshwater habitat; and wildlife habitat (Caltrans, 2000).

Table 6-1 shows existing Merced River water quality conditions below Snelling Diversion Dam, approximately 8 miles upstream of the project area, and near Newman, approximately 42 miles downstream from the project area.

6.2.2 Criteria for Determining Significance

The Regional Water Quality Control Board (RWQCB), and the California Department of Health Services regulate the primary water quality standards and the Maximum Contaminant Levels (MCLs) for California's drinking water supplies. State water quality standards must at least match Federal standards, but are often more stringent. The following potential Project related impacts would be considered significant and would require monitoring and treatment (Caltrans, 2000):

- Exceedance of state water quality objectives for any given parameter;
- Discharge of oils, grease, or any other material that would result in a film on the water or objects in the water;
- Alteration of the suspended sediment load and suspended sediment discharge rate that causes a nuisance or adversely affects beneficial uses;
- Alteration of surface water temperatures unless demonstrated to RWQCB that no impacts to beneficial uses would occur;
- Changes in turbidity that cause a nuisance or adversely affect beneficial uses.

Table 6-1. Existing Merced River Water Quality (USGS, 1999 and 1994).

Parameter	Below Snelling Diversion Dam (September 1994)	Near Newman (September 1999)	USEPA National Recommended Ambient Water Quality Criteria
Specific Conductance (US/cm)	34	405.0	--
pH (std units)	7.3	7.7	6.5-8.5
Temperature (°C)	16.5	22.9	Dependent upon biota
Dissolved Oxygen (mg/L)	9.3	6.9	≥5.0
Dissolved Oxygen (% saturation)	96	81	≥85.0
Nitrite, Dissolved (mg/L as N)	<0.010	0.02*	--
Nitrogen, Dissolved (NO ₂ +NO ₃), (mg/L as N)	<0.050	2.6*	10,000 ppb (NO ₃ only)
Nitrogen, Ammonia dissolved (mg/L as N)	<0.010	0.02*	Varies with temperature and pH
Nitrogen, Ammonia+Organic Total (mg/L as N)	<0.20	0.2*	--
Nitrogen, Ammonia+Organic Dissolved (mg/L as N)	<0.20	0.3*	--
Phosphorous Total (mg/L as P)	<0.010	0.08*	--
Phosphorous, Dissolved (mg/L as P)	<0.020	0.05*	--
Phosphorous, Ortho Dissolved (mg/L as P)	<0.010	0.04*	--

*Values from August 1999; September values not reported for these parameters.

6.2.3 Environmental Consequences

6.2.3.1 No Action Alternative

Without the proposed Robinson reach phase and under existing conditions, water quality would remain as it is now. Results of stream temperature modeling studies on the lower Merced River indicate that in recent years, temperature limits for salmon spawning were commonly exceeded in portions of the spawning reach in October. This contributed to delayed upstream migration and spawning. In recent drought years, returning adults were first observed in the lower Merced River in early November, rather than in October as in previous years, because high water temperatures blocked their upstream migration.

6.2.3.2 Proposed Robinson Reach Phase

Construction would begin May 1, 2001, and continue through October 30, 2001. A second construction season would occur between May 1, 2002 and October 30, 2002. Some limited out-of-channel work may occur during the winter months of 2001/2002, such as gravel transport and sorting. Best Management Practices (BMPs) will be implemented to mitigate for any construction related pollutants, so any potential impacts resulting from discharge of pollutants or sediment into surface waters are considered to be less than significant. In addition, avoidance and conservation measures will be followed as outlined in Appendix J. Water quality will improve for the long term after project construction, due to a decrease in fine sediment transport and water temperature (Caltrans 2000, USGS 1994, USGS 1999).

6.2.3.3 Related Actions

The Lower and Western Stone Reaches will also use BMPs to mitigate any construction related pollutants. These BMPs would reduce any potential impacts from discharge of pollutants or sediment into surface waters to levels that are considered to be less than significant. In addition, avoidance and conservation measures will be followed as outlined in Appendix J.

6.3 Climate/Air Quality

6.3.1 Affected Environment

The proposed Robinson reach phase is within the eight county San Joaquin Valley Air Basin. The San Joaquin Valley Unified Air Pollution Control District monitors air quality in the county. Air quality throughout the basin is affected by a combination of air contaminants, meteorological conditions and the topographical configuration of the valley. Atmospheric conditions such as wind speed, wind direction and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants. A primary factor responsible for the increase of air pollution is population growth. Population growth is accompanied by increased amounts of air pollutants and particulate matter produced by: operation of vehicles; industrial processes; mining operations; and agricultural activities, such as agricultural burning and ground disturbance.

Merced County is classified as a non-attainment area for ozone and particulate matter (PM₁₀). Table 6-2 shows existing air quality data for Merced County. The project area is surrounded by grazing land, orchards, and gravel mining operations. No sensitive receptors, defined as residential and other areas where young, elderly, or infirm people would be present, are in the project vicinity.

Table 6-2. Existing Air Quality Data for Merced County.

Pollutant	Standards		Annual State Exceedances (days)	High*
	State	Federal		
Ozone (ppm), 1 hour	0.09	0.12	42 (1999)	0.102
PM ₁₀ (µg/m ³), 24 hour	50.00	150.00	4 (1996)	61.00
Carbon Monoxide (ppm), 1 hour	20.00	35.00	0 (1992)	9.00
Nitrogen Dioxide (ppm)**	0.25	0.053	unavailable	0.072 1 hr 0.013 av.

* Most recent year for which data is available; all data from 1997, with the exception of PM₁₀, which is 1996 data. The annual statistics and ambient air quality standards were obtained from the California Air Resources Board online database and the federal standard uses a annual arithmetic mean.

6.3.2 Criteria for Determining Significance

The San Joaquin Valley Unified Air Pollution Control District has established criteria for determining local air basin impact significance. These criteria comply with State and Federal standards for identified air pollutants, and identify threshold limits for the air basin for pollutants that exceed State standards. Project emissions that exceed the threshold limits set forth by the District are considered significant and require mitigation. Additionally, exposure of sensitive receptors to substantial pollutant concentrations would be considered a significant impact.

6.3.3 Environmental Consequences

6.3.3.1 No Action Alternative

Without the proposed Robinson reach phase, the air quality for the area would not be affected except for actions that take place under existing conditions. Air quality may gradually become worse as population, construction, and industry in the Merced River watershed increase.

6.3.3.2 Proposed Robinson Reach Phase

Construction activities may potentially result in localized, short-term construction emissions from stationary, mobile, and area sources. Emissions may include hydrocarbons, nitrogen oxides, sulfur oxides, carbon monoxide, and particulate matter. Fugitive dust may be emitted during use of earth working equipment. Equipment used during construction is summarized in Table 6-3.

Table 6-3. Equipment to be Used During Construction of the Robinson Phase.

Type of Equipment	Number of Each Type	Estimated Use for Each Equipment Type (days)	Estimated Total Use (hours)*
Pickup Truck	7	300	16,800
D-9 Bulldozer	2	270	4,320
621 F Scraper	4	180	5,760
D-8 Bulldozer	2	180	2,880
Water Truck	2	270	4,320
325 BL Excavator	2	270	4,320
Dump Truck (25yd ³)	7	270	15,120
988 Loader	4	180	5,760
Flat-bed Semi Truck	100	1	800

* An 8-hour per day, 5-day work week is assumed.

As described in the mitigation measures, best management practices (BMPs) for air quality control will be implemented, including minimization of fugitive dust. Normal working hours will be 0700-1600, Monday through Friday inclusive, excluding legal holidays. Construction would begin May 1, 2001, and continue through October 30, 2001. A second construction season would occur between May 1, 2002 and October 30, 2002. Some limited out-of-channel work may occur during the winter months of 2001/2002, such as gravel transport and sorting. The construction equipment described in Table 6-3 reflects this potential winter work, and therefore shows the maximum potential equipment use. If

necessary, the construction schedule and work hours may be modified by the Project Engineer.

Project-related construction activities will result in temporary adverse impacts to air quality. However, because the best available air quality control technologies will be implemented during project construction, air quality impacts are considered to be less than significant. Avoidance and conservation measures will be followed, as outlined in Appendix J.

6.3.3.3 Related Actions

The Lower and Western Stone Reaches would also apply BMPs for air quality control. These best available air quality control technologies would be implemented during project construction and would reduce air quality impacts to levels that would be less than significant. Avoidance and conservation measures will be followed (Appendix J).

6.4 Biological Resources

Presence of special-status species or other special habitats occurring within the project area was determined in part by evaluation of California Natural Diversity Database (CNDDDB) search, request and review of a Service species list for the project (Appendix B), consultation with resource agency personnel, and field surveys of plant and wildlife species.

Special-status plant species are defined as vascular plants that are: (1) designated as rare, threatened, or endangered by the State or Federal governments; (2) proposed for rare, threatened, or endangered status; (3) State or federal candidate species; (4) listed as Species of Concern by the Service; or (5) included on the California native Plant Society (CNPS) List 1A, 1B, and 2 (North State Resources Inc., 1999).

Special-status fish and wildlife species are defined as taxa that are: (1) designated as threatened or endangered by the State or Federal governments (i.e., listed species); (2) proposed or petitioned for federal threatened or endangered status; (3) State or federal candidates for threatened or endangered status; (4) identified by the Service as Species of Concern; or (5) identified by the CDFG as Species of Special Concern.

The CNDDDB was reviewed for records of special status plant, fish, and wildlife occurrences in the Yosemite Lake and Winton U.S. Geological Survey 7.5 minute quadrangles. This review produced a list of sightings of special-status species within the project vicinity. The CNDDDB is a database that consists of historical observations of special-status plant, fish, and wildlife species, and special plant communities. The CNDDDB is only composed of reported sightings and is not a comprehensive list of plant, fish, and wildlife species for the area.

The Merced River riparian corridor and associated habitat (river miles 40.5-44.4) were surveyed to identify special-status plant and wildlife species and/or potential habitat for these species. Surveys were conducted by DWR and CDFG staff between November, 1998 and

July, 2000. Surveys were conducted using binoculars, the unaided eye, observation of wildlife sign (scat, tracks, burrows, trails, nests, etc.), live trapping (small mammals), camera stations, and by identification of wildlife vocalizations. To determine potential project-related impacts to special-status plant species, walking surveys were conducted for special-status plants within the Robinson, Western Stone, Lower Western Stone, and Ratzlaff reaches between 1998 and 2000.

6.4.1 Vegetation

6.4.1.1 Affected Environment

Vegetation within the vicinity of the project area (Fig. 3) consists mainly of valley oak woodland. Riparian vegetation occupies areas along the Merced River stream channel, adjacent floodplains, and areas within and around gravel tailings and other mined areas that have developed conditions suitable for riparian plant colonization. Much of the vegetation throughout the project area has been influenced by past mining activities. The existing corridor of riparian vegetation is quite narrow compared to historical conditions, because much of the estimated 150-year floodplain is used for intensive agricultural activities.

The Robinson reach is located between river miles 42.1 and 44.4 (J59 bridge). Perennial marsh is common along the river channel. Most are dominated by young willows (*Salix* spp.) with an understory of rice cutgrass (*Leersia oryzoides*). This community is most common in sections of the river channel that are shallow, have a low gradient, and are vaguely defined. Mining and high flows in 1997 caused these conditions to prevail throughout most of the reach. Perennial wetlands dominated by rushes (*Juncus* sp.), bullrush (*Scirpus acutus occidentalis*), and cattail (*Typha* sp.) also are present. Also in the project area are seasonal wetlands dominated by spiny cocklebur (*Xanthium spinosum*) and willow weed (*Polygonum lapathifolium*). Willow, button bush scrub, and mature riparian forest is present along remaining berms and levees, and in patches on large gravel bars and islands. These areas are mostly on the North side of the project area. A dense Himalayan blackberry (*Rubus ursinus*) understory exists in many of these areas. The south side of the reach has lightly scattered riparian vegetation and consists primarily of upland vegetation dominated by an overstory of valley oak (*Quercus lobata*) and Elderberry (*Sambucus* sp.). Understory growth is mainly non-native grasses and various forbs. A list of plants identified during the Robinson reach surveys is included in Appendix I.

Construction throughout the project area will require significant amounts of riparian vegetation to be removed. This is only a temporary impact, since revegetation efforts will result in a larger acreages of riparian habitat than pre-project conditions. These riparian species will provide river shade, improve bank stabilization, and increase available wildlife nesting and foraging habitat. This project is structured to provide no net loss to the existing riparian habitat, and is intended to produce a positive long-term gain to the future riparian environment.

The Lower Western Stone reach is located between river miles 40.5 and 41.3. This reach also has a narrow strip of riparian vegetation associated with the river channel. Riparian vegetation in this reach is primarily composed of cottonwood (*Populus fremontii*), box elder (*Acer negundo*), white alder (*Alnus rhombifolia*), Gooding's black willow (*Salix gooddingii*), arroyo willow (*Salix lasiolepis*), sandbar willow (*Salix exigua*), Oregon ash (*Fraxinus latifolia*), buttonwillow (*Cephalanthus occidentalis*), and valley oak (*Quercus lobata*). There is elderberry (*Sambucus mexicana*) lightly scattered throughout the site, as well as Himalayan blackberry (*Rubus discolor*) understory. Herbaceous species such as mugwort (*Artemisia douglasiana*), verbena (*Verbena bonariensis*), willow weed (*Epilobium brachycarpum*), and western marsh cudweed (*Gnaphalium palustre*) are also present. Elderberry is lightly scattered throughout the reach, and a dense Himalayan blackberry understory is prevalent. Adjacent to the strip of riparian vegetation, the north bank supports an ongoing gravel operation, with numerous stockpiles and a few nearby siltation ponds, which support a dense aggregation of cattail (*Typha* spp.). The south bluff is steep, the top of which supports vineyards and residences.

The Western Stone reach is located between river miles 41.3 and 42.1 (J59 bridge). The vegetation is similar to that of the Lower Western Stone reach, with a corridor of riparian forest cloaking both banks, mid-channel islands, and peninsulas. Adjacent to the river corridor, along the north bank, is an ongoing gravel operation. The south bluff is steep, and on the upper terrace are orchards and a residence.

6.4.1.1.1 Special Status Plants

Plant inventories and specific special status plant surveys were conducted within the Robinson reach between summer, 1999 and spring, 2000. No special status plant species were found. Plant inventories and special status plant surveys have not yet been completed within the Western Stone and Lower Western Stone reaches. Given the proximity of these three reaches, the plant species composition is likely to be similar. Detailed plant surveys and special status plant surveys will be completed within the Western Stone and Lower Western Stone reaches prior to any project disturbance occurring in this reach. A list of plants identified during the Robinson reach surveys is included in Appendix I.

The following paragraphs describe the special-status plant species potentially occurring in the entire project area.

Heartscale (*Atriplex cordulata*)

Description

Heartscale is a California endemic, a Federal species of concern, and ranked by CNPS as very rare (Calflora, 2000). This species is closely associated with sandy saline or alkaline soils between 0 and 100 feet in elevation (Calflora, 2000). This species historically occurred throughout the Sacramento and San Joaquin valleys (Hickman, 1993).

Presence in Project Area

The CNDDDB does not contain any known occurrences of heartscale near the project area, but this plant is known to occur in various locations throughout Merced County (Calflora, 2000). This species is not likely to be present in any of the four project reaches.

Brittlescale (*Atriplex depressa*)

Description

Brittlescale is a California endemic and is ranked by CNPS as very rare. This species historically occurred throughout the Sacramento and San Joaquin valleys (Hickman, 1993) and is associated with shadscale scrub, valley grassland, and alkali sink plant communities (Calflora, 2000).

Presence in Project Area

The CNDDDB does not contain any known occurrences of brittlescale near the project area, but this plant is known to occur in various locations throughout Merced County (Calflora, 2000). Focused surveys for this species did not locate any individuals within the project area. This species is not likely to be present in any of the four project reaches.

Fleshy owl's-clover (*Castilleja campestris succulenta*)

Description

This is a California endemic, and a Federally Threatened and State Endangered species. It is ranked by the California Native Plant Society (CNPS) as very rare (Calflora, 2000). This species is closely associated with vernal pools and moist places between 25-750 m in elevation, and often occurs in acidic soils (CNDDDB). This species historically occurred throughout the San Joaquin Valley and associated Sierra Nevada foothills where vernal pools and other appropriate habitat were present.

Presence in Project Area

The CNDDDB lists 3 known occurrences of fleshy owl's clover near the project area. Because this plant species is dependent upon short grass vernal pool landscapes, it is unlikely that this species occurs within the project area. While the land adjacent to the Merced River riparian corridor may have historically supported vernal pools, intensive agriculture has replaced this habitat type in the project area vicinity. Focused surveys for this species did not locate any individuals within the project area. This species is not likely to be present in any of the four project reaches.

Henderson's bent grass (*Agrostis hendersonii*)

Description

Henderson's bent grass, previously named *A. microphylla* var. *hendersonii*, is a California native, a Federal Species of Concern, and is ranked by CNPS as extremely rare (Calflora, 2000). This species is typically found in vernal pool habitats, but is occasionally found in

non-wetlands (Calflora, 2000). This species historically occurred in California's Sacramento and northern San Joaquin valleys, and in the Cascade Range and Sierra Nevada foothills north through Oregon (Hickman, 1993).

Presence in Project Area

The CNDDDB does not contain any known occurrences of Henderson's bent grass near the project area, but this plant is known to occur in various locations throughout Merced County (Calflora, 2000). Focused surveys for this species did not locate any individuals within the project area. This species is not likely to be present in any of the four project reaches.

Colusa grass (*Neostapfia colusana*)

Description

Colusa grass is a California endemic, and a Federally Threatened, State Endangered species. It is ranked by CNPS as rare (Calflora, 2000). This species is always found in vernal pool or vernal flooded habitat (Calflora, 2000). This species historically occurred throughout the Great Central Valley, but is now known from only Colusa, Merced, Solano, and Stanislaus counties (Hickman, 1993).

Presence in Project Area

The CNDDDB does not contain any known occurrences of Colusa grass near the project area, but this plant is known to occur in various locations throughout Merced County (Calflora, 2000). Focused surveys for this species did not locate any individuals within the project area. This species is not likely to be present in any of the four project reaches.

San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*)

Description

San Joaquin Valley Orcutt grass is a California endemic, and is a Federally Threatened, State Endangered species. It is ranked by CNPS as very rare. This species is closely associated with vernal pools and moist places below 656 feet in elevation. This is currently known to occur in Fresno, Madera, Merced, Stanislaus, and Tulare counties (Hickman, 1993).

Presence in Project Area

The CNDDDB contains no records documenting the presence of this species in the project area. Focused surveys for this species did not locate any individuals within the project area. This species is not likely to be present in any of the four project reaches.

Hairy Orcutt grass (*Orcuttia pilosa*)

Description

Hairy Orcutt grass, also called pilose Orcutt grass, is endemic to the Sacramento Valley (CNDDDB). This is a Federal and State Endangered species, and is ranked by the California Native Plant Society (CNPS) as very rare. This species is closely associated with vernal pools

and moist places between 82-410 feet in elevation (CNDDDB). This species is currently known to occur in Madera, Merced, Stanislaus, and Tehama counties (Hickman, 1993).

Presence in Project Area

The CNDDDB lists one occurrence of hairy Orcutt grass near the project area. This occurrence is located 3.2 miles south of Snelling, on the west side of Snelling road. The initial occurrence was made from a herbarium specimen collected in 1957. The plant was described as common at the time of collection. A return visit to the site in 1986 did not locate any hairy Orcutt grass, but the habitat was found to be suitable. Because this plant species is dependent upon short grass vernal pool landscapes, it is unlikely that this species occurs within the project area. Focused surveys for this species did not locate any individuals within the project area. This species is not likely to be present in any of the four project reaches.

6.4.1.2 Criteria for Determining Significance

Impacts to botanical resources would be considered significant if they result in one of the following criteria:

- Direct mortality of state or federally listed plant species;
- Indirect reductions in the size of a special status plant species population;
- Potential to reduce the extent or values of habitats in which special-status plant populations occur.

6.4.1.3 Environmental Consequences

6.4.1.3.1 No Action Alternative

Under the No-Action Alternative, there would be no project related impacts to riparian vegetation or existing special status plant species.

6.4.1.3.2 Proposed Robinson Reach Phase

Temporary impacts to riparian plant species are expected to occur as a result of the proposed Robinson reach phase, due to a temporary loss of habitat. To reduce impacts, all avoidance and conservation measures will be followed, as outlined in Appendix J. The post-construction revegetation plan would create native riparian habitat, and the final reach would result in a more natural floodplain. Species selection and planting pattern would generally attempt to reproduce species composition and vegetational structure of similar natural sites. Isolated islands of vegetation in the river channel would no longer exist and riparian vegetation would be allowed to grow naturally along the river.

Impacts to federal or State listed endangered or threatened plant species, or plant species proposed for listing as endangered or threatened are not expected to occur as a result of the proposed alternative. Potential habitat for federal or State listed endangered or threatened plant

species, or plant species proposed as endangered or threatened, was not located within the project area boundaries. All general vegetation avoidance and conservation measures will be followed, as outlined in Appendix J.

6.4.1.3.3 Related Actions

Prior to construction, surveys will be conducted in the Lower and Western Stone reaches for special status plants. No impacts to riparian plant species are expected to occur as a result of these phases, and all avoidance and conservation measures will be followed, as outlined in Appendix J. Impacts to federal or State listed endangered or threatened plant species, or plant species proposed for listing as endangered or threatened are not expected to occur in the Lower and Western Stone reaches. All general vegetation avoidance and conservation measures will be followed, as outlined in Appendix J.

6.4.2 Jurisdictional Waters of the U.S.

A delineation of jurisdictional waters of the U.S., including wetlands, was conducted within the project area in July, 2000 by DWR staff. The amount of existing riverine and open water habitat that is under the Corps' jurisdiction was determined by estimating the acreage presently inundated at a flow of 1,700 cfs. Existing wetlands within the project area were delineated in accordance with criteria in the 1987 Corps of Engineers Wetland Delineation Manual. The estimated amount of riverine, open water, and wetland habitat created by the project was predicted using the same criteria that were used to determine the existing acreage.

Perennial marsh is common along the river channel. Most are dominated by young willows (*Salix* sp.) with an understory of rice cutgrass (*Leersia oryzoides*). This community is most common in sections of the river channel that are shallow, have a low gradient, and are vaguely defined. Mining and high flows in 1997 have caused these conditions to prevail throughout most of the riverine classification boundary. Perennial wetlands dominated by rushes (*Juncus* spp.), bullrush (*Scirpus acutus* var. *occidentalis*), and cattail (*Typha* spp.) are also present. In the project area too, are seasonal wetlands dominated by spiny cocklebur (*Xanthium spinosum*) and willow weed (*Polygonum lapathifolium*). Willow and button bush scrub and mature riparian forest is present along remaining berms and levees, and in patches on large gravel bars and islands. These areas are mostly on the North side of the project area. A dense Himalayan blackberry (*Rubus ursinus*) understory exists in many of these areas. Riparian vegetation on the south side of the reach is patchy and uncommon.

There are 62 acres of existing jurisdictional wetlands in the project area (Table 6-4). Approximately 56 of these acres consist of perennial and seasonal wetlands, scrub-shrub wetlands, and forested wetlands. These wetlands are within the riverine boundary. Outside of the riverine boundary, there are approximately 2 acres of wetland habitat that are perpetuated by irrigation, either incidentally or purposely, by an adjacent agricultural ditch system that runs along the north side of the project area. Approximately 4 acres of wetland are also present in an

area separated from the river by a berm. This area was excavated to the water table during aggregate mining and likely receives groundwater, as well as surface water, via seepage through the berm.

Table 6-4. Summary of existing, impacted, and created jurisdictional waters of the U.S., showing post project conditions and overall change in acreage for the Robinson Reach.

	Other Waters (acres)		Total Water (acres)	Herbaceous (acres)	Woody (acres)	Wetland Total (acres)
	Riverine	Open				
Within 1,700 cfs						
Existing & Impacted Waters	153	9	162	29	33	62
Created Jurisdictional Waters	66	0	66	36	13	49
Net Gain/Loss	- 87	- 9	- 96	8	- 20	- 13
Within 2,250 cfs						
Existing & Impacted Waters	157	9	166	29	33	62
Created Jurisdictional Waters	310	0	310	0	114	114
Net Gain/Loss	153	- 9	144	- 29	81	52

6.4.2.1 Criteria for Determining Significance

Impacts to jurisdictional waters would be considered significant if they resulted in a permanent decrease in the function and value of wetland and riparian habitat within the project reach.

6.4.2.2 Environmental Consequences

6.4.2.2.1 No Action Alternative

Under a No-Action Alternative, no impacts to existing jurisdictional waters would occur.

6.4.2.2.2 Proposed Robinson Reach Phase

A summary of the impacts to jurisdictional wetlands and other waters from the proposed Robinson reach phase is provided in Table 6-4. Implementation of the Robinson reach phase will impact all existing wetlands in the project area, but will result in the creation of an estimated 114 acres of jurisdictional wetland. This will constitute a net gain of 52 acres of wetland habitat, 36 acres of herbaceous wetlands and 78 acres of scrub-shrub and forested riparian habitat. The acreage of riverine and open water habitat will be reduced by 96 acres due to a reduction in amount of area inundated at 1,700 cfs. This occurs because the project will reestablish the river channel, eliminating areas that are characterized by sheet flow and lack a defined river channel. Also, open water habitat would be eliminated as abandoned gravel extraction pits are filled. Despite the reduction of area inundated at 1,700 cfs, the project will increase the amount of active floodplain when flows exceed 1,700 cfs. At the two-year return flow of 2,250 cfs, approximately 310 acres would be inundated compared to approximately 157 acres under current conditions.

A mixture of herbaceous and woody wetland types are expected to occur on the floodplain and within the 49 acres of riverine area. Wetland adjacent to the river channel (16 acres) and within the simulated abandoned channels, backwater, and wetland area portions of the project (33.07 acres) will comprise these riverine acres. Within the floodplain, an estimated 65 acres of scrub-shrub and forested wetland habitat would develop. To aid the development of wetland habitat on the floodplain, wetland plant species will be planted and irrigated following construction. Compared to undisturbed sites along the Merced River, the existing vegetative condition of the project site is very different and is likely far outside of the natural range of variability for this section of the Merced River corridor. Due to the restoration of geomorphic function along the project reach, the riparian habitat that will be planted and that will develop naturally within the floodplain is expected to more closely mimic undisturbed riparian habitats that exist at upstream reference sites.

6.4.2.2.3 Related Actions

The Lower and Western Stone reaches will be surveyed similar to the Robinson reach for jurisdictional wetlands. These phases are likely to affect existing wetlands in these reaches, but may create additional acres of jurisdictional wetland. Overall, the completed Lower and Western Stone's floodplain is expected to more closely mimic undisturbed riparian habitats that exists at upstream reference sites.

6.4.3 Wildlife

The Merced River riparian corridor provides habitat for many wildlife species, including mammals, herpetofauna, and avifauna. Based on geographic and vegetative characteristics, the Robinson, Western Stone, Lower Western Stone, and Ratzlaff reaches are in an area transitional between the valley floor and foothill wildlife habitat. This is reflected by the wildlife species composition of the area, as a mixture of both resident and migratory valley and foothill species occur.

Wildlife inventories and specific surveys were conducted within the Robinson reach between summer 1999 and summer 2000. The Lower Western Stone reach will have wildlife inventories and specific surveys conducted prior to any project related disturbance in that reach. A list of wildlife species observed during the Robinson reach survey is included in Appendix H.

6.4.3.1 Affected Environment

The proposed project area and the surrounding habitat include agriculturally influenced annual grassland, scattered with sparse areas of residual riparian and oak woodland habitats and many orchards and vineyards. Although adjacent wildlife habitat conditions and surrounding agricultural acreage are not conducive for large wildlife populations, several species are found in and adjacent to the proposed project site. Species may include, but are not limited to, mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), racoon (*Procyon lotor*), opossum (*Didelphis virginiana*), river otter (*Lutra canadensis*), muskrat (*Ondatra zibethicus*), ground squirrel

(*Spermophilus beecheyi*), skunk (*Mephitis mephitis*) and several other species of rodents. Several raptor species, resident and migratory birds, valley quail (*Callipepla californica*), waterfowl, great blue herons (*Ardea herodias*) and various species of egrets frequent areas within the vicinity of the project.

6.4.3.1.1 Special Status Wildlife Species

The following special-status wildlife species were detected in the Robinson reach during surveys: San Joaquin pocket mouse (*Perognathus inornatus inornatus*), Western pond turtle (*Clemmys marmorata*) (Robinson reach), Swanson's Hawk (*Buteo swainsoni*), White-faced Ibis (*Plegadis chihi*), pallid bat (*Antrozous pallidus*), Yuma myotis (*Myotis yumanensis*), red bat (*Lasiurus blossevillii*), and Western mastiff bat (*Eumops perotis*). Additionally, potential habitat for the federally threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (VELB) occurs within the entire project area.

The following section describes the special-status wildlife species potentially occurring in the entire project area (listed in Table 6-5).

Special-Status Mammals

Small-footed myotis bat (*Myotis ciliolabrum*)

Description

The small-footed myotis bat is found throughout California, except the coastal redwood region. This bat roosts in mines and tree cavities and forages in the open, feeding on small moths, flies, ants, and beetles. Although a fairly common species, small-footed myotis bats are listed as a federal Species of Concern due to declines related to mine reclamation, water impoundment, and timber harvest (Philpott, 1998).

Presence in the Project Area

There have been no recent sightings of this species within the project area vicinity, and the CNDDDB has no records within the two quadrangles that encompass this project. However, it is possible that nest cavities exist in the riparian forest that exists throughout the project area.

While the Merced River riparian corridor may provide suitable nesting and foraging habitat, construction activity will be limited to daylight hours. Pre-construction surveys will be conducted for this species, and if small-footed myotis bats are found, species-specific avoidance and conservation measures will be followed as outlined in Appendix J.

Long-eared myotis bat (*Myotis evotis*)

Description

The pale golden long-eared myotis bat is associated primarily with forest habitat, roosting in caves, mines, trees, crevices, buildings, and bridges. This bat is widely distributed throughout California and is one of the most abundant species in giant sequoia (*Sequoiadendron giganteum*) habitat. It is uncommon almost everywhere, however, and is

Table 6-5. Special-status plants and animals which may be present in the Robinson reach.

Taxa	Scientific Name	Common Name	Federal Status	State Status
Mammals	<i>Myotis ciliolabrum</i>	Small-footed myotis bat	Sp.of Concern	None
	<i>Myotis evotis</i>	Long-eared myotis bat	Sp.of Concern	None
	<i>Myotis thysanodes</i>	Fringed myotis bat	Sp.of Concern	None
	<i>Myotis volans</i>	Long-legged myotis bat	Sp.of Concern	None
	<i>Myotis yumanensis</i>	Yuma myotis bat	Sp.of Concern	Special Concern
	<i>Antrozous pallidus</i>	Pallid Bat	None	Special Concern
	<i>Lasiurus blossevillei</i>	Red Bat	None	Proposed MSSC
	<i>Eumops perotis californicus</i>	Greater western mastiff-bat	Sp.of Concern	Special Concern
	<i>Corynorhinus townsendii townsendii</i>	Pacific western big-eared bat	Sp.of Concern	Special Concern
	<i>Vulpes macrotis mutica</i>	San Joaquin kit fox	Endangered	Threatened
	<i>Ammospermophilus nelsoni</i>	San Joaquin antelope squirrel	Sp.of Concern	Threatened
	<i>Perognathus inornatus</i>	San Joaquin pocket mouse	Sp.of Concern	None
	<i>Dipodomys heermanni dixonii</i>	Merced kangaroo rat	Sp.of Concern	None
	<i>Neotoma fuscipes riparia</i>	Riparian woodrat	Endangered	None
	<i>Sylvilagus bachmani riparius</i>	Riparian brush rabbit	Endangered	Endangered
Birds	<i>Branta canadensis leucopareia</i>	Aleutian Canada goose	Threatened	Special Concern
	<i>Plegadis chihi</i>	White-faced ibis	Sp.of Concern	None
	<i>Grus canadensis tabida</i>	Greater sandhill crane	None	Threatened
	<i>Charadrius montanus</i>	Mountain plover	Proposed T	Special Concern
	<i>Circus cyaneus</i>	Northern harrier	None	Special Concern
	<i>Buteo swainsoni</i>	Swainson's hawk	None	Threatened
	<i>Buteo regalis</i>	Ferruginous hawk	Sp.of Concern	Special Concern
	<i>Heliaeetus leucocephalus</i>	Bald Eagle	Threatened	Endangered

	<i>Falco peregrinus</i>	Peregrine falcon	Delisted	Endangered
	<i>Falco mexicanus</i>	Prairie falcon	None	Special Concern
	<i>Athene cunicularia</i>	Burrowing owl	Sp.of Concern	Special Concern
	<i>Coccyzus americanus occidentalis</i>	Yellow-billed Cuckoo	None	Endangered
	<i>Empidonax traillii brewsteri</i>	Little willow flycatcher	Sp.of Concern	Endangered
	<i>Riparia riparia</i>	Bank Swallow	None	Threatened
	<i>Agelaius tricolor</i>	Tricolored blackbird	Sp.of Concern	Special Concern
	<i>Amphispiza belli belli</i>	Bell's Sage Sparrow	Sp.of Concern	None
Reptiles	<i>Clemmys marmorata</i>	Western pond turtle	Sp.of Concern	Special Concern
	<i>Phrynosoma coronatum frontale</i>	California horned lizard	Sp.of Concern	Special Concern
	<i>Gambelia silus</i>	Blunt-nosed leopard lizard	Endangered	Endangered
	<i>Anniella pulchra pulchra</i>	Silvery legless lizard	Sp.of Concern	None
	<i>Thamnophis gigas</i>	Giant garter snake	Threatened	Threatened
Amphibians	<i>Ambystoma californiense</i>	California tiger salamander	Candidate	Special Concern
	<i>Scaphiopus hammondi</i>	Western spadefoot	Sp.of Concern	Special Concern
	<i>Rana aurora draytonii</i>	California red-legged frog	Threatened	Special Concern
Invertebrates	<i>Branchinecta conservatio</i>	Conservancy fairy shrimp	Endangered	None
	<i>Branchinecta lynchi</i>	Vernal pool fairy shrimp	Threatened	None
	<i>Lepidurus packardi</i>	Vernal pool tadpole shrimp	Endangered	None
	<i>Lindieriella occidentalis</i>	California linderiella	Sp.of Concern	None
	<i>Lytta molesta</i>	Molestan blister beetle	Sp.of Concern	None
	<i>Desmocerus californicus dimorphus</i>	Valley elderberry longhorn beetle	Threatened	None

listed as a federal Species of Concern due to disturbances from timber harvest, recreational caving, bridge replacement, building demolition, and pest control (Philpott, 1998).

Fringed myotis bat (*Myotis thysanodes*)

Description

The Fringed myotis bat is brown with a distinct cinnamon tone and is found in a variety of habitats in California, from low desert scrub to high elevation coniferous forest. It roosts primarily in buildings and mines, although it has been known to also roost in tree hollows and rock crevices in cliff faces. This bat is widely distributed, though rare, throughout western North America. It is very sensitive to roost disturbance and is listed as a federal Species of Concern due to impacts from recreational caving, mine reclamation, building demolition, timber harvest, and bridge replacement (Philpott, 1998).

Presence in the Project Area

No suitable habitat is available for this species in the project area. This species is not likely to be present in any of the four project reaches.

Long-legged myotis bat (*Myotis volans*)

Description

The long-legged myotis bat roosts primarily in hollow trees (though it also uses mines and crevices in cliffs) throughout California and the Western United States. This bat is found in pinyon-juniper, Joshua tree woodland, and montane coniferous forests. It also is a transient resident of the eastern Sierra Nevada range during the Spring. Listed as a federal Species of Concern, the long-legged myotis is impacted by timber harvest, aerial pesticide spraying, recreational caving, mine reclamation, building demolition, and pest control (Philpott, 1998).

Presence in the Project Area

Suitable habitat for this species is not available in the project area. This species is not likely to be present in any of the four project reaches.

Yuma myotis bat (*Myotis yumanensis*)

Description

A dull brown or buff color, the Yuma myotis bat (also known as the San Joaquin bat) is found throughout California, particularly along wooded canyon bottoms and in the deserts of southeastern California. A colonial species, groups of up to 2,000 of them may be found roosting in caves and old buildings (Jameson and Peeters, 1988). It is also associated with low elevation reservoirs and hollow redwoods in coastal California. The Yuma myotis bat is a State Species of Special Concern and federal species of concern. Although locally common, populations are declining due to impacts from timber harvest, mining, building demolition, pest control, and bridge replacement (Philpott, 1998).

Presence in the Project Area

The CNDDB has no records within the two quadrangles that encompass this project, but bat surveys conducted by Dixie Pierson in conjunction with URS Greiner Woodward Clyde documented the presence of this species within the project area. The SR 59 Bridge serves as a

summer maternity roost for this species, and the adjacent riparian corridor served as summer foraging habitat (Pierson, 2000). Species-specific avoidance and mitigation measures will be incorporated into the project description. Since the project will result in an increase in riparian habitat, the project will have a long-term positive impact on this species.

Pallid Bat (*Antrozous pallidus*)

Description

The pallid bat is a large, light colored bat with large prominent ears. Pallid bats are common in desert and grassland habitats throughout the southwestern U.S., especially in areas near water (Hermanson and O'Shea, 1983). Pallid bats roost in small colonies in rock crevices and man-made structures, and rarely in caves. Diurnal roosts may be shared with other bat species such as the Brazilian free-tailed bat and Yuma myotis (Hermanson and O'Shea, 1983). Pallid bats forage between 0.5 and 2.5 km from the day roost. The pallid bat is a State Species of Special Concern. Although locally common, populations are very sensitive to disturbance of roosting sites (CDFG, 1990b).

Presence in the Project Area

The CNDDDB has no records of Pallid bats within the two quadrangles that encompass this project, but bat surveys conducted by Dixie Pierson in conjunction with URS documented the presence of this species within the project area. The SR 59 Bridge serves as a summer maternity roost for this species, and the adjacent riparian corridor served as summer foraging habitat (Pierson, 2000). Species-specific avoidance and mitigation measures will be incorporated into the project description. Since the project will result in an increase in riparian habitat, the project will have a long-term positive impact on this species.

Red bat (*Lasiurus blossevillii*)

Description

The red bat has an upper body that is brick red to rusty red washed with white; males are usually more brightly colored than females. Red bats are locally common in some areas of California, occurring from Shasta County to the Mexican border, west of the Sierra Nevada/Cascades Crest, and deserts (CDFG, 1990b). Roosting habitat includes forests and woodlands between sea level and mixed coniferous forest. Preferred roost sites are in edge habitat adjacent to streams, fields, or urban areas. Roost sites are usually solitary, and can be between 2 and 40 ft from the ground (CDFG, 1990b). The red bat is a proposed State Species of Special Concern.

Presence in the Project Area

The CNDDDB has no records of red bats occurring within the two quadrangles that encompass this project, but bat surveys conducted by Dixie Pierson in conjunction with URS documented the presence of this species within the project area. The cottonwood riparian habitat provides significant roosting and foraging habitat for reproductive female red bats during the summer. Although the red bat could be adversely affected by impacts to riparian roosting habitat,

species-specific avoidance and mitigation measures will be incorporated into the project description. Since the project will result in an increase in riparian habitat, the project will have a long-term positive impact on this species.

Greater western mastiff-bat (*Eumops perotis californicus*)

Description

The gray or dark brown greater western mastiff bat is found in a variety of habitats, from desert scrub to chaparral to mixed conifer forest. Its distribution is tied to availability of roost sites that are 20 feet or more above the ground. Typical roost sites include crevices in cliff faces, cracks in boulders, and occasionally buildings. It is detected most often over desert washes, grasslands, or meadows, but will also feed above forest canopy. The distribution of the greater western mastiff-bat is southern and central California, at low to mid-elevations. They are found primarily in southern California and west of the Sierra Nevada Crest, although there are a few records of occurrences in the coast range. This species is listed as a State and Species of Special Concern and a federal species of concern due to the loss of foraging habitat and disturbance of roosting sites by recreational climbing and highway construction (Jameson and Peeters, 1988).

Presence in the Project Area

The CNDDDB has no records within the two quadrangles that encompass this project, but bat surveys conducted by Dixie Pierson in conjunction with URS documented the presence of this species within the project area. No suitable roost sites are available for this species in or adjacent to the project area, but the riparian habitat present in the project area is likely being used for summer foraging habitat (Pierson, 2000). Species-specific avoidance and mitigation measures will be incorporated into the project description. Since the project will result in an increase in riparian habitat, the project will have a long-term positive impact on this species.

Pacific western big-eared bat (*Corynorhinus townsendii townsendii*)

Description

Formerly classified as the Townsend's long-eared bat (*Plecotus townsendii*), the Pacific western big-eared bat is a medium-sized, light brown bat with very long ears that join at the top of its head. This is a cave-dwelling species that is sometimes found in buildings, and is often associated with desert scrub and pinyon-juniper habitats. The Pacific western big-eared bat ranges all over the State of California, including the Channel Islands and Rocky Mountain States, from Mexico north to British Columbia. The State (Jameson and Peeters, 1988) lists it as a Species of Special Concern and it is a federal species of concern.

Presence in the Project Area

There have been no recent sightings of this species within the project area vicinity, and the CNDDDB has no records within the two quadrangles that encompass this project. No suitable roosting or foraging habitat is available for this species in or adjacent to the project area. This species is not likely to be present in any of the four project reaches.

San Joaquin kit fox (*Vulpes macrotis mutica*)

Description

Comparable in size to a small dog or large cat, the San Joaquin kit fox is the largest of the eight subspecies of kit fox. San Joaquin kit fox are basically nocturnal, but they occasionally come out during the day, and the pups may be seen playing near the den. A mated kit fox pair may use up to 39 dens in a single year, although a fox usually spends its primarily solitary life within a 1-2 square mile area. They either dig these dens themselves or enlarge squirrel or badger dens. Natal dens, generally the largest and most complex type of den, may be constructed over a period of several years (Morrel, 1972). Kit fox are also known to use manmade structures, such as small-diameter culverts (USFWS, 1997b).

The San Joaquin kit fox historically inhabited the semi-arid regions of California's Central Valley and adjacent foothills. Much of this range has been reduced as a result of agricultural and urban development and they are now primarily found in the grasslands and scrub habitats of the southern San Joaquin Valley. They are also found in and adjacent to agricultural and urban areas (Speigel et al., 1994).

In 1965, the California Fish and Game Commission classified the San Joaquin kit fox as a protected furbearer, and in 1971 the State classified it as "rare" (now Threatened) under the 1970 California Endangered Species Act. The U.S. Secretary of the Interior listed the subspecies as Endangered under the Endangered Species Protection Act of 1973, as amended.

In the north, the habitat is so fragmented by urbanization and agriculture that this portion of the population is very close to extinction. Kit fox throughout their range are also subject to disease, predation, roadkill, off-road vehicles, shooting, trapping, and rodenticide mortality (USFWS, 1983).

Presence in the Project Area

Potential habitat for the San Joaquin kit fox is present in the project area on the southern side of the Robinson reach. Walking transects of this potential habitat yielded no potential dens or sign indicative of this species. Baited camera stations and track pads also failed to indicate presence of San Joaquin kit fox in the project area. The CNDDDB records do not list any occurrences of San Joaquin kit fox within the project area. No project-related impacts will occur to potential habitat for this species. This species is not likely to be present in any of the four project reaches.

San Joaquin antelope squirrel (*Ammospermophilus nelsoni*)

Description

Relatively small, an adult San Joaquin antelope squirrel only grows to about six inches in length (the tail adds an additional 3 inches). The home range of this species varies widely according to study location. Individuals in a study population 65 miles west of Fresno primarily stayed within 11 acres (Hawbecker, 1958), while individuals on the Elkhorn Plain use 12-49 acres. This species depends on sparse grasslands with moderate shrub cover.

Approximately 80% of this habitat has been converted for agricultural and urban uses. No prime habitat remains in the San Joaquin Valley. Significant populations exist only in western Kern County and Elk Hills, and on portions of the Carrizo Plains and Elkhorn Plains. In 1980, the State listed the San Joaquin antelope squirrel as a Threatened species under the California Endangered Species Act. In 1991, the federal government identified this species as a candidate for listing under the Endangered Species Act. Habitat conversion continues to be the greatest threat, but their survival is also threatened by rodenticide use (CDFG, 1992).

Presence in the Project Area

While this species was historically found in Merced County, there have been no recent sightings and the CNDDDB has no records within the two quadrangles that encompass this project. The seasonally flooded nature of the Merced River riparian corridor provides poor habitat for the San Joaquin antelope squirrel. The grassland habitat that exists on the southern side of the Robinson reach is suitable habitat for this species. However, the entire project area is further east than the historic range for this species. Surveys conducted for this species in July and August 1999, concurrent with other biological surveys, had negative results. This species is not likely to be present in any of the four project reaches.

San Joaquin pocket mouse (*Perognathus inornatus*)

Description

Pocket mice are distinguished by their small body size (less than five inches), weak front feet and strong hind feet, and fur-lined cheek pouches that open on either side of the mouth. They burrow into the ground for nest sites, preferring pliable, sandy soil. Pocket mice are nocturnal and forage for seeds.

The silky-haired San Joaquin pocket mouse is confined to the Central Valley of California, where large-scale habitat conversion to agricultural and urban uses has resulted in this species being listed as a federal Species of Concern (Burt and Grossenheider, 1980).

Presence in the Project Area

Scattered small mammal burrows are present in a few locations on the southern side of the Robinson reach, close to the J59 bridge. DWR conducted small mammal surveys in these areas in October 1999. These surveys confirmed the presence of San Joaquin pocket mouse within the project area. Pre-construction surveys will be conducted for this species and if San Joaquin pocket mice are found, species-specific avoidance and conservation measures will be followed as outlined in Appendix J.

Merced kangaroo rat (*Dipodomys heermanni dixonii*)

Description

The Merced kangaroo rat, a subspecies of the more common Heermann's kangaroo rat has similar coloration to other species in the same genus. Heermann's kangaroo rats can be distinguished from San Joaquin kangaroo rats based on their larger size and the presence of a

fifth toe on each hind foot. The subspecies *D.h. dixonii* is distinguished from other members of the species based on tail coloration and skull measurements.

The Heermann's kangaroo rat occurs in California from Suisun Bay and Lake Tahoe south to Point Conception and from the Sierra Nevada and Tehachapi Mountains west to the Pacific Ocean. The Merced kangaroo rat has a much smaller range, although the limits of that range are somewhat uncertain (Kelt, 1988). According to the CNDDDB, this subspecies is found in grassland and savanna communities in eastern Merced and Stanislaus counties. The Merced kangaroo rat is listed as a Species of Special Concern by the federal government (CDFG, 1999).

Presence in the Project Area

There have been no recent sightings of this species within the project area vicinity, and the CNDDDB has no records within the two quadrangles that encompass this project. No kangaroo rat sign has been observed in the entire project area, and small mammal surveys conducted by DWR in October 1999 did not detect the presence of any kangaroo rat species. This species is not likely to be present in any of the four project reaches.

Riparian woodrat (*Neotoma fuscipes riparia*)

Description

The riparian woodrat has a furry tail, unlike the scaled tails of nonnative rats (*Rattus rattus*). This species feeds on nuts, fruits, fungi, foliage and some forbs, and inhabits areas with evergreen or live oaks, deciduous valley oaks, or other thick-leaved trees and shrubs. The highest densities of woodrats and their two to five foot high houses of sticks are often encountered in willow thickets with an oak overstory (USFWS, 2000).

Historically, this subspecies is believed to have ranged from Vernalis in Stanislaus County as far south as northern Fresno County. There is only one known extant population, restricted to about 250 acres of riparian forest on the Stanislaus River in Caswell Memorial State Park. The riparian woodrat was listed as an Endangered species by the Service on February 23, 2000 (USFWS, 2000).

Presence in the Project Area

Potential habitat for riparian woodrats is available along the Merced River riparian corridor, which is present throughout the project area. Surveys for woodrat houses were conducted by DWR staff in Spring, 2000. Survey efforts yielded no evidence of woodrats. A survey effort will be conducted prior to construction. If riparian woodrats are encountered, mitigation currently being developed with the Service will be implemented. This species is not likely to be present in the project area and revegetation efforts will improve habitat conditions for this species. Pre-construction surveys will be conducted and if riparian woodrats are found, species-specific avoidance and conservation measures will be followed as outlined in Appendix J and formal consultation with the Service would commence.

Riparian brush rabbit (*Sylvilagus bachmani riparius*)

Description

The riparian brush rabbit is one of eight subspecies of brush rabbits found in California. It can be distinguished from other subspecies by its pale color, gray sides, dark back, and outward-protruding cheeks. It remains close to shrub cover, feeding on grasses, sedges, clover, forbs, shoots, and leaves.

Historically, the riparian brush rabbit was present in the riparian forests along the San Joaquin River and its tributaries, from at least Stanislaus County to the Sacramento-San Joaquin Delta. Caswell Memorial State Park, on the Stanislaus River in southern San Joaquin County, contains the only known population of riparian brush rabbits. The riparian brush rabbit was listed by the Service as an Endangered species on February 23, 2000 (USFWS, 2000).

Presence in the Project Area

Potential habitat for riparian brush rabbit is available along the Merced River riparian corridor, especially in areas with a dense blackberry understory (Laurissa Hamilton, personal communication). This habitat type is scattered throughout the project area. Surveys for this species were conducted by DWR staff in July 2000. No riparian brush rabbits were located. A survey effort will be conducted prior to construction. If riparian brush rabbits are encountered, mitigation currently being developed with the Service will be implemented. This species is not likely to be present in the project area and revegetation efforts will improve habitat conditions for this species. Pre-construction surveys will be conducted and if riparian brush rabbits are found, species-specific avoidance and conservation measures will be followed as outlined in Appendix J and formal consultation with the Service would commence.

Special-Status Birds

Aleutian Canada Goose (*Branta canadensis leucopareia*)

Description

The Aleutian Canada goose is brownish gray with a black neck and head, and has a distinctive white chin patch extending up the sides of its head. There are six subspecies of Canada geese that winter in California. Aleutian Canada geese from the western Aleutian Islands in Alaska migrate to the Upper San Joaquin Valley of California in autumn and return to their breeding grounds in March and April. During the winter, this subspecies can be found feeding during the day in harvested farm fields and irrigated cattle pastures and roosting at night in willow water near their feeding sites (Garrett et al., 1994). The Service listed the Aleutian Canada goose as an Endangered species in 1967, then re-classified it as Threatened in 1990 as conservation efforts reversed its downward decline. On August 3, 1999, the Service stated that recovery goals had been met and proposed removing the Aleutian Canada goose from the list of Threatened and Endangered species (USFWS, 1999d).

Presence in the Project Area

Agricultural fields that could serve as potential foraging habitat for this subspecies are present adjacent to the project area. Potential resting habitat exists throughout the project area. However, biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR during the fall and winter months did not detect the presence of this species in the project area. The CNDDDB contains no records documenting the presence of this species in the project area. Since this species is only potentially present in the fall and winter, and construction will take place in the summer, the project will not have a significant impact on this species.

White-faced Ibis (*Plegadis chihi*)

Description

The white-faced ibis is a long-legged marsh wader with a long, decurved bill. White-faced ibises can be found throughout the western United States. This species eats small crustaceans, small fish and insects. This species is present in wetland areas of the northern San Joaquin Valley. The white-faced ibis is listed as a federal Species of Concern due to wetland habitat losses within its range (Peterson, 1990).

Presence in the Project Area

Potential habitat for white-faced ibis is present within the project area in scattered shallow water ponds that are filled or surrounded with bullrush (*Scirpus* spp.) and cattail (*Typha* spp.). Most of this habitat will be filled in or converted to scour channels during floodplain construction, which are intended to support seasonal wetlands. Biological surveys conducted by Caltrans (Jon Stead, personal communication) and DWR have not detected the presence of this species in the project area. No records were located in the CNDDDB. The project will not have a significant impact on this species.

Greater Sandhill Crane (*Grus canadensis tabida*)

Description

Standing almost 5 feet tall, with a wingspan of over 6 feet, the greater sandhill crane is one of three subspecies of sandhill crane that appear in California. Greater sandhill cranes nest in wet meadows, often near marshes, and maintain long-term pair bonds. Cranes are opportunistic feeders, eating aquatic invertebrates, insects, worms, and occasionally small mammals, young birds and bird eggs. In fall and winter, they also feed on grain and plant material. This species is migratory, breeding in Oregon, Washington and Canada and wintering in the Central Valley from Chico south to the Pixley NWR in Tulare County. The greater sandhill crane is listed in California as a Threatened species due to habitat loss, agricultural operations, overgrazing and power line collisions. Their low reproductive potential also hinders recovery (Elliot and Littlefield, 1994).

Presence in the Project Area

Patches of potential habitat for greater sandhill cranes is present within the project area. The CNDDDB does not contain any confirmed sightings in or adjacent to the project area, and biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect presence of this species in the project area. Because greater sandhill cranes only winter in California, they would not be present during the construction period. The project will not have a significant impact on this species, and the project is likely to have a long term positive impact on this species.

Mountain Plover (*Charadrius montanus*)

Description

Plovers are medium sized, long-tailed wading birds with short, fairly thick bills and yellowish legs (Sauer, 1995). This species requires level areas with very short grass, and intensive grazing is beneficial to them. Historically, the mountain plover was a widespread summer resident of the short-grass prairies on the western Great Plains. Currently, nearly half of the remaining breeding population is found in Weld County, Colorado and Phillips County, Montana. The status of wintering mountain plover populations is poorly understood, but most are found in California, with small numbers in Arizona and Texas (Sauer, 1995). In 1999, the Service proposed this species for listing under the Endangered Species Act as Threatened, and the State considers it a Species of Special Concern.

Presence in the Project Area

Potential habitat that could be utilized by mountain plover is present in the project area on the southern side of the Robinson reach. The CNDDDB does not contain any confirmed sightings in or adjacent to the project area, and biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect presence of this species in the project area. Mountain plovers only winter in California, so they should not be present during construction activities. The project will not have a significant impact on this species.

Northern Harrier (*Circus cyaneus*)

Description

The northern harrier, previously referred to as a marsh hawk, is a slim, long-winged, long-tailed raptor, approximately 17-24 inches in size. Breeding northern harriers generally inhabit marshlands, wet meadows, and other damp grassland habitats across the United States and Canada, though they also are found in upland fields. Although primarily a migratory species, they are year-round residents of the Central Valley (Sauer, 1995). The northern harrier is a State Species of Special Concern.

Presence in the Project Area

There is potential habitat for the northern harrier both in and adjacent to the project area. Although there are no records of this species in the CNDDDB, foraging northern harriers were

observed on the project area during surveys. Potential northern harrier roosting habitat will be removed as a result of this project, but the small number of suitable roosting trees that will be affected are insignificant relative to the number of suitable roosting trees in the project area. In addition, floodplain construction and river channel reconfiguration will ultimately improve and expand the available riparian habitat in the project area, in conjunction with intensive revegetation efforts. Since the project will result in an increase in riparian habitat, the project will have a long-term positive impact on this species.

Swainson's Hawk (*Buteo swainsoni*)

Description

A medium-sized hawk, the Swainson's hawk is distinguished by its long, slender wings, which can span up to 4 feet in an adult. Swainson's Hawks breed and raise their young in California during the spring and summer, then migrate to Central and South America for the fall and winter (Bloom and Van de Water, 1994). This species typically nests in edge habitat, favoring large riparian trees, such as cottonwoods. Nesting Swainson's hawks are also sometimes found in lone trees or groves of trees in agricultural fields (CDFG, 1992).

Swainson's hawk is a State listed Threatened species.

Presence in the Project Area

Potential foraging, nesting, and roosting habitat for this species is present in and adjacent to the project area. Swainson's hawk surveys were conducted in May, 1999, but these focused surveys were limited to one-quarter mile around the J59 bridge. However, during biological surveys, a Swainson's hawk was observed in a tree in the Ratzlaff reach, approximately 1 mile downstream from the J59 bridge on the south side of the Merced River (Jon Stead, personal communication). CDFG staff also observed a Swainson's hawk in the same general area that May.

No Swainson's hawk nests have been found within the project area, but detailed species specific surveys will be repeated in Spring 2001 throughout the entire project area. The CNDDDB contains no records documenting the presence of this species in the project area. Some potential Swainson's hawk roosting habitat will be removed as a result of this project, but the small number of suitable roosting trees that will be affected are insignificant relative to the number of suitable roosting trees in the project area. In addition, floodplain construction and river channel reconfiguration will ultimately improve and expand the available riparian habitat in the project area, in conjunction with intensive revegetation efforts. Pre-construction surveys will be conducted for this species and if Swainson's hawks are found, species-specific avoidance and conservation measures will be followed as outlined in Appendix J.

Ferruginous Hawk (*Buteo regalis*)

Description

The ferruginous hawk is 23-25 inches in size; one of the largest of the Buteos. This species is found on the plains and prairies of the western United States and southwestern Canada, and

feeds on rodents, small birds, reptiles and rabbits. It is a State and federal Species of Concern (Peterson, 1990).

Presence in the Project Area

Potential foraging habitat for the ferruginous hawk is present adjacent to the project area. Biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect the presence of this species in the project area. The CNDDDB contains no records documenting the presence of this species in the project area. This project will only have a temporary impact to a small portion of available foraging habitat, so the project will not have a significant impact on this species, and would most likely provide a long-term benefit.

Bald Eagle (*Haliaeetus leucocephalus*)

Description

Although bald eagles younger than 3 years old can be mistaken for golden eagles, adult bald eagles are unmistakable with their white head and tail. This species prefers to forage over bodies of water and catch fish, although they will also eat birds, mammals, reptiles, and carrion. They forage from snags, large conifers, or other perches, and often roost in communal stands of old-growth trees. Most of California's bald eagles are year-round residents of their nesting areas, but many out-of-state bald eagles also winter in California (Gertsch et al., 1994b). The Service listed bald eagles south of the 40th parallel as Endangered in 1967, down listed the species to Threatened in 1995, and on July 6, 1999, proposed removing this species from the Threatened species list, as recovery goals had been met. This species is fully protected under the federal Bald and Golden Eagle Protection Act and is listed as a State Endangered species.

Presence in the Project Area

Potential roosting and foraging habitat exists within the project area. The CNDDDB does not contain any confirmed sightings of bald eagles in or adjacent to the project area, and biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect presence of this species in the project area. Potential bald eagle nesting and roosting habitat will be removed as a result of this project, but the small number of suitable nesting and roosting trees that will be affected are insignificant relative to the number of suitable nesting and roosting trees in the project area. In addition, floodplain construction and river channel reconfiguration will ultimately improve and expand the available riparian habitat in the project area, in conjunction with intensive revegetation efforts.

Pre-construction surveys will be conducted for this species and if bald eagles are found, species-specific avoidance and conservation measures will be followed as outlined in Appendix J.

American Peregrine Falcon (*Falco peregrinus*)

Description

Adult peregrine falcons have a slate blue back and white-buff underside, with dark spots on its breast and dark bars on its flanks. They feed on other birds, often killing them in midair with their talons. Peregrine Falcons nest in ledges, caves, and potholes on high vertical cliffs overlooking rivers, lakes, or the ocean. They often migrate long distances, although they are year-round residents of California (Gertsch et al., 1994a). In 1970, the Service listed the peregrine falcon as Endangered under the federal Endangered Species Act. On August 25, 1999, the Service removed the peregrine falcon from the list, claiming that recovery goals had been met and that the Migratory Bird Treaty Act would sufficiently protect the bird (USFWS, 1999e). California still classifies it as an Endangered Species.

Presence in the Project Area

While potential peregrine falcon foraging habitat is present in the project area, suitable nesting habitat is not present in or adjacent to the project area. The CNDDDB does not contain any confirmed sightings in or adjacent to the project area, and biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect presence of this species in the project area. The project will not have a significant impact on this species.

Prairie Falcon (*Falco mexicanus*)

Description

Prairie falcons are 17 inch-long, streamlined birds of prey with pointed wings and long tails. Prairie falcons eat birds, rodents and insects. They prefer grassland habitats throughout the western United States and range in elevation from mountain meadows to open plains and prairies. They nest in ledges on vertical cliffs and occasionally in rock crevices facing open habitats. They are a State Species of Special Concern (Peterson, 1990).

Presence in the Project Area

Potential prairie falcon foraging habitat is present in the project area on the southern side of the Robinson reach. Nesting habitat is not present, however, in or adjacent to the project area. The CNDDDB does not contain any confirmed sightings in or adjacent to the project area, and biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect presence of this species in the project area. The project will not have a significant impact on this species.

Burrowing Owl (*Athene cunicularia*)

Description

Approximately seven to nine inches in size, this barred and spotted owl is often seen in the daytime, standing erect on the ground or on posts. Burrowing owl habitat includes annual and perennial grasslands, deserts, and arid scrub lands characterized by low-growing vegetation. Burrows are the essential element of their habitat. Burrowing owls typically use burrows

made by other animals, but may also use man-made structures such as culverts, cement, asphalt or wood debris piles, and openings beneath cement or asphalt pavement (CDFG, 1995a). Their range includes the western United States and Southwestern Canada (Peterson, 1990). They are listed as a State species of special concern and federal Species of Concern due to habitat loss from agricultural and urban development.

Presence in the Project Area

Potential burrowing owl habitat is present in the project area on the southern side of the Robinson reach. Walking transects of this potential habitat yielded no appropriately sized burrows or sign indicative of this species. Biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect presence of this species in the project area. There are no CNDDDB burrowing owl records in or adjacent to the project area. The project will not have a significant impact on this species.

Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)

Description

The yellow-billed cuckoo is commonly 11-13 inches in length, and has a slender body and zygodactyl feet. Both sexes are similar in appearance. Cuckoos prefer high to intermediate tree canopy for nesting and sometimes are found to utilize walnut orchards adjacent to riparian zones. They almost always prefer to forage in riparian forest with a dense understory. Willow trees are a favored component of nesting and foraging sites. Traditionally, the yellow-billed cuckoo was found wherever there was an outbreak of tent caterpillars. Today they feed largely upon katydid and sphinx moth larvae (when available), grasshoppers, and cicadas. The birds are diurnal and active year long, migrating to Argentina in September and returning to California in June. Due to the decrease in riparian habitat, yellow-billed cuckoo numbers have declined in the western states. There are an estimated 50-100 existing pairs of yellow-billed cuckoos in California (CDFG, 1990a). Yellow-billed cuckoo are a State listed endangered species.

Presence in the Project Area

Potential nesting and foraging habitat for yellow-billed cuckoo exists throughout the project area. The CNDDDB does not contain any confirmed sightings of yellow-billed cuckoo in or adjacent to the project area, and biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect presence of this species in the project area. Some potential nesting habitat will be removed as a result of this project, but the small amount of suitable nesting habitat that will be affected is insignificant relative to the amount of suitable nesting habitat in the project area. Pre-construction surveys will be conducted for this species and species-specific avoidance and mitigation measures will be incorporated into the project description. Floodplain construction and river channel reconfiguration will ultimately improve and expand the available riparian habitat in the project area. This species is not likely to be present in any of the four project reaches.

Little Willow Flycatcher (*Empidonax traillii brewsteri*)

Description

The willow flycatcher is five to six inches in size and similar in appearance to California's other six flycatcher species. As its name indicates, this bird is insectivorous, and hunts from a low, exposed perch at the edge of a woodland. Willow flycatchers nest from sea level to about 8,000 feet in elevation, favoring open to semi-open brushy areas over heavily timbered habitats. As their name also indicates, they nest in willows (McKernan and Whitfield, 1994).

The little willow flycatcher is one of three geographically separate subspecies of willow flycatcher that breed in California, arriving in May and returning to Central and South America in September. California has listed them as a species, rather than by subspecies, because the subspecies are genetically similar and are imperiled for the same reasons (McKernan and Whitfield, 1994). Threats to this species include the loss of riparian habitat, impacts to breeding birds associated with livestock grazing, and nest parasitism by brown-headed cowbirds. Once common, only five populations of significance remain in isolated meadows of the Sierra Nevada and along the Kern, Santa Margarita, San Luis Rey and Santa Ynez rivers. The willow flycatcher was listed as a State Endangered Species in 1991, and is a federal Species of Concern (CDFG, 1992).

Presence in the Project Area

Although there are no known little willow flycatchers in the Merced River riparian corridor, potential nesting and foraging habitat is abundant throughout the project area. Of the potential little willow flycatcher nesting habitat within the Robinson reach, only a small amount will be removed. The amount of habitat affected within the other reaches is not yet known and will be quantified when the project design is complete. The small acreage of suitable nesting habitat that will be affected are insignificant relative to the amount of suitable habitat in the project area. In addition, floodplain construction and river channel reconfiguration will ultimately improve and expand the available riparian habitat in the project area, in conjunction with intensive revegetation efforts. Pre-construction surveys will be conducted for this species and if little willow flycatchers are found, species-specific avoidance and conservation measures will be followed, as outlined in Appendix J.

Bank Swallow (*Riparia riparia*)

Description

This small, brown backed swallow averages 11-14 cm in length. They are commonly found near cliffs, steep riverbanks, and gravel pits. Bank swallows are colonial breeders, requiring sandy soil in which to dig their nesting burrows. Bank swallows feed primarily on insects hawked in flight over riparian, grassland, and agricultural areas. The bank swallow exhibits year-long diurnal activity, spending winters in South America and returning to California by April. Population numbers are declining due to channelization of and stabilization of river banks. There are currently an estimated 50-60 remaining colonies in California (CDFG, 1990a). Bank swallows are a State listed Threatened species.

Presence in the Project Area

Potential bank swallow habitat exists throughout the project area. However, all potential habitat such as sheared levee banks were occupied by northern rough-winged swallows. Cliff swallows are also numerous within the project area, using the SR 59 Bridge as nesting habitat.

The CNDDDB does not contain any confirmed sightings in or adjacent to the project area, and biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect presence of this species in the project area. The project will not have a significant impact on this species.

Tricolored Blackbird (*Agelaius tricolor*)

Description

The tricolored blackbird is approximately seven to nine inches in length, with different coloration in the male and female. The male of this species, similar to the red-winged blackbird, is black with bright red shoulder patches (a yellow margin is also sometimes visible), but is distinguished by the addition of a conspicuous white margin. The female is a darker shade of brown than other blackbird species and has a sharply pointed bill. They nest in dense colonies in cattail or tule marshes and forage in open fields from Oregon south to Baja California. It is listed as both a State and federal Species of Concern (Peterson, 1990).

Presence in the Project Area

Potential breeding and foraging habitat for the tricolored blackbird is present within the project area in scattered shallow water ponds that are filled or surrounded with bullrush (*Scirpus* ssp.) and cattail (*Typha* ssp.). Most of this habitat will be filled in or converted to scour channels during floodplain construction. However, biological surveys conducted by Caltrans (Jon Stead, personal communication) and DWR have not detected the presence of this species in the project area. The CNDDDB records do not list any occurrences of tricolored blackbird within the project area. The project will not have a significant impact on this species.

Bell's Sage Sparrow (*Amphispiza belli belli*)

Description

Bell's sage sparrow, formerly known as Bell's sparrow, is primarily gray in color with a white breast and faint white streaks over the eyes. Distinguishing marks include a single dark breast spot and heavy whiskers (Peterson, 1990). Average length is 5-6 inches. Bell's sage sparrow can be wary and elusive, but exhibits year-long diurnal activity, spending winters in southeastern deserts. Some populations have been noted to appear in the Sierra Nevada and east of the Cascade Range around April. Birds are reproductively active from late March to mid-August, peaking in May and June (CDFG, 1990a). As ground nesters, they prefer low and fairly dense herbs and shrubs, utilizing chaparral and alkali shrubs for breeding and nesting grounds. Common cover includes *Artemisia*, *Atriplex*, *Purshia*, and *Adenostoma*. Their diet consists of seeds, insects, and greenery found in low foliage and beneath shrubs. Daily water intake is on average 49% of body weight and cannot be derived from seed alone.

Some sources suggest that a portion of water intake may come from invertebrates or succulent plant consumption (Moldenhauer and Wiens, 1970). Bell's sage sparrow is listed as a federal Species of Concern.

Presence in the Project Area

No chaparral or alkali scrub habitat exists within the project area. The CNDDDB does not contain any confirmed sightings in or adjacent to the project area, and biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect presence of this species in the project area. The project will not have a significant impact on this species.

Special-Status Reptiles

Western pond turtle (*Clemmys marmorata*)

Description

The western pond turtle is 3.5-7.5 inches in size, with an olive, dark brown, or blackish shell. This is an aquatic turtle, which is found near ponds, marshes, rivers, streams, and irrigation ditches with rocky or muddy bottoms and aquatic vegetation, such as watercress, cattails, and water lilies. They eat plants, insects, worms, fish, and carrion. The western pond turtle ranges from western Washington south to Baja California, mostly west of the Cascade-Sierran Crest, although they are also found in the Mojave, Truckee and Carson rivers. This is a State species of special concern and federal Species of Concern (Stebbins, 1985).

Presence in the Project Area

Potential habitat for this species occurs throughout the project area. Western pond turtles are known to occur in the Robinson and Ratzlaff reaches of the project area, from both CNDDDB reports and project related biological surveys. They likely occur in the Lower Western Stone reach as well. This project will result in permanent and temporary habitat reduction for this species, since most of the gravel ponds will be filled and converted to floodplain. Creation of several scour channels has been incorporated into the project design, which will result in seasonal ponds in most years when flows of at least 1,500 cfs occur (Dave Encinas, personal communication). Pre-construction surveys will be conducted for this species and if western pond turtles are found, approved avoidance and conservation measures will be followed.

California horned lizard (*Phrynosoma coronatum frontale*)

Description

The California horned lizard, sometimes called a "horny toad," is a flat bodied lizard up to 6 inches in length that has a large crown of spines on the back of the head. This species is diurnal, and subsists primarily on ants. Suitable habitat for this species consists of exposed gravelly-sandy substrate containing scattered shrubs, chemise chaparral, annual grasslands scattered with seepweed or saltbush, or clearings in riparian woodland. The California horned lizard occurs along the coast north of San Francisco Bay to Los Angeles and inland into the

Sacramento and San Joaquin valleys, inhabiting open areas with sandy soil and low sparse vegetation (Toyon Environmental Consultants, 1998). The California horned lizard is a State and federal Species of Concern.

Presence in the Project Area

Potential habitat for the California horned lizard occurs in a few locations on the southern side of the Robinson reach, close to the J59 bridge. This habitat is only marginal, as the area lacks low sparse shrub vegetation and is heavily cultivated to provide pasture for cattle or has been compacted by mining activities. There are a few open areas in the riparian corridor that could also provide habitat, but these areas also lack sparse shrubby cover. The majority of the riparian corridor in the project area is quite dense. The CNDDDB does not contain any confirmed sightings of this species in or adjacent to the project area, and general biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect presence of this species in the project area. The project will not have a significant impact on this species.

Blunt-nosed leopard lizard (*Gambelia silus*)

Description

The blunt-nosed leopard lizard uses its cryptic combination of pale crossbars and dark spots to blend into the surrounding habitat and wait for its prey, which is primarily composed of grasshoppers, cicadas, and small lizards. Habitat for this species includes sparsely vegetated plains, alkali flats, low foothills, canyon floors, large washes, and arroyos (Montanucci, 1965). The size of the local population may be dependent on the number of mammal burrows available for use (Hansen et al., 1994).

The State and federal governments in 1967, primarily as a result of habitat loss and fragmentation, listed the Blunt-nosed leopard lizard as an Endangered species. The species is now confined to 15-20% of its original range (Germano and Williams, 1992). Grazing practices may also negatively impact this species. Although a certain amount of grazing may be beneficial in reducing the non-native vegetation, overgrazing results in soil compaction, damage to rodent burrows and loss of vegetative cover (USFWS, 1985). Because their primary prey is insects, grasshopper and leafhopper control programs carried out in the western and southern parts of the San Joaquin Valley may have a significant negative impact on this species as well (Montanucci, 1965).

Presence in the Project Area

Potential habitat for the blunt-nosed leopard lizard is present in a few locations on the southern side of the Robinson reach, close to the J59 bridge. This habitat is only marginal, since the grass species are quite dense in most of this area. The grassland adjacent to the project area is intensively grazed and has been disced, or compacted by mining activities in most areas. In addition, there are very few shrubby plants that would provide cover, and small mammal burrows are localized to only a few locations. The CNDDDB does not contain any

confirmed sightings of this species in or adjacent to the project area, and general biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect presence of this species in the project area. This species is not likely to be present in any of the four project reaches.

Silvery legless lizard (*Anniella pulchra pulchra*)

Description

The silvery legless lizard is a subspecies of the 4- to 7- inch long California legless lizard. They require moisture, plant cover, and loose soil for burrowing. They are found in chaparral and pine-oak woodland, and streamside sycamore, cottonwood, and oak understory. They forage in leaf litter for insects and spiders. The range for this species includes scattered occurrences on the floor of the San Joaquin Valley (Stebbins, 1985). The silvery legless lizard is a federal Species of Concern.

Presence in the Project Area

Potential habitat for this species occurs throughout the project area. Most of the areas that will be directly impacted have a gravel or cobble substrate, which is marginal habitat for the silvery legless lizard. The CNDDDB does not contain any confirmed sightings of this species in or adjacent to the project area, and general biological surveys conducted by a consultant (URS) for Caltrans (Jon Stead, personal communication) and DWR did not detect presence of this species in the project area. The project will not have a significant impact on this species, and revegetation efforts should improve the habitat suitability for this species.

Giant garter snake (*Thamnophis gigas*)

Description

The giant garter snake (*Thamnophis gigas*) is up to 5 feet in length, brown to olive colored, and is sometimes checkered with black spots. It feeds primarily on aquatic prey such as fish and amphibians. The predominant food items of giant garter snakes are now introduced species, such as carp, mosquito fish, other small fish, and bullfrogs (USFWS, 1999b).

Giant garter snakes were historically found on the valley floors of the Sacramento and San Joaquin valleys of California, from Butte County southward to Kern County. Agricultural and flood control activities have eliminated the giant garter snake from the southern one-third of its range and have caused severe declines in subpopulations throughout the San Joaquin Valley (USFWS, 1999b). The giant garter snake was listed by the State as a threatened species in 1971, and it was federally listed as threatened in 1993 (USFWS, 1999b).

Giant garter snakes begin emerging from winter retreats around the beginning of April. By mid-April, most giant garter snakes are active and beginning to search for food. By May, most giant garter snakes have emerged and are actively foraging. Giant garter snakes begin seeking winter retreats at the beginning of October. Foraging and other activities are sporadic during

this time and are dependent upon weather conditions. By the beginning of November, most snakes are in winter retreats where they will remain until spring (USFWS, 1999b).

The giant garter snake inhabits agricultural wetlands and other waterways, such as irrigation and drainage canals, ricelands, marshes, sloughs, ponds, small lakes, low gradient streams, and adjacent uplands in the Central Valley. Essential habitat components consist of: (1) adequate water during the snake's active season to provide adequate permanent water to maintain dense populations of food organisms; (2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season; (3) upland habitat with grassy banks and openings in waterside vegetation for basking; and (4) higher elevation upland habitats for cover and refuge from flood waters during the snake's inactive season in winter (USFWS, 1999b).

Presence in the Project Area

Potential marginal habitat for the giant garter snake is present throughout the project area, in the scattered shallow ponds that were previously extraction pits or that were formed by channel scouring during the 1997 flood event. There are no confirmed sightings of giant garter snakes in the CNDDDB, and focused amphibian surveys around potential giant garter snake habitat did not detect the presence of this species in the project area (URS Greiner Woodward Clyde, 2000). It is unlikely that this species occurs within the project site, however, but if it is found during pre-construction surveys, species-specific avoidance and conservation measures will be followed as outlined in Appendix J and formal consultation would commence.

Special-Status Amphibians

California Tiger Salamander (*Ambystoma californiense*)

Description

The California tiger salamander (*Ambystoma californiense*) is a stocky salamander with a broad, rounded snout and small eyes. Small larvae and hatchlings feed primarily on zooplankton. Larger larvae feed heavily on Pacific tree frog (*Pseudacris regilla*) and red-legged frog (*Rana aurora*) tadpoles and are often cannibalistic (Hoffman and Pfennig, 1999). Other food items include aquatic invertebrates (Petranka, 1998). Adults eat earthworms, snails, insects, fish, and small mammals (CDFG, 1988).

California tiger salamanders are found most commonly in annual grassland habitat, but populations also occur in valley-foothill hardwood habitats. Its range includes the Central Valley from Kern County north to Yolo County, and coastal grasslands from San Francisco Bay south to at least Santa Barbara County (CDFG, 1988). Their survival is threatened by habitat loss from urbanization and agricultural production (Petranka, 1998). California tiger salamanders are a federal candidate species and a State Species of Special Concern.

California tiger salamander adults and juveniles spend most of the year in subterranean refugia and are rarely seen above ground, except during the winter breeding season when the ground is moist (CDFG, 1988). Migrations to and from breeding ponds occur November-April, although most movement occurs December-March on just a few rainy nights. Breeding occurs in fish-free, seasonally ephemeral ponds, which form in January or February following spring rains. Females attach their eggs singly to stems, twigs, vegetation or detritus. Eggs hatch 2-4 weeks after they are deposited. The larval period lasts 3-6 months since most breeding ponds dry up with the onset of summer (Petranka, 1998).

Prime habitat for the California tiger salamander is annual grassland, but seasonal ponds or vernal pools are crucial for breeding. Permanent pools and reservoirs are used as well (CDFG, 1988). Little is known about the distance that adults and juveniles travel away from breeding ponds, although movement studies of other *Ambystoma* species indicate a 200-500 m radius home range. California tiger salamanders may have a commensal relationship with ground squirrels and pocket gophers, since they rely heavily on their burrows for summer aestivation sites. Adults are capable of burrowing through moist soil in plugged rodent burrows (Petranka, 1998).

Presence in the Project Area

The CNDDDB lists a known occurrence of tiger salamander larvae approximately 2 miles NNW of Yosemite Lake, approximately 10 miles south of the project area. This species prefers grassy vernal pool landscapes (Petranka, 1998), so it may occur in nearby grasslands but not within or directly adjacent to the project area. While the land adjacent to the Merced River riparian corridor may have historically supported vernal pools, intensive agriculture has replaced this habitat type in the project area vicinity. The non-native grassland located on the southern side of the Robinson reach is intensively grazed, and has been repeatedly disced. All permanent pools within the project area are filled with predatory fish species (URS Greiner Woodward Clyde, 2000) and California ground squirrel (*Spermophilus beechyi*) burrows are confined to a few areas on the southern side of the Robinson reach. Focused surveys for California tiger salamander larvae did not detect the presence of this species. Based on these surveys, the marginal aquatic habitat, and the abundance of aquatic predators, it is unlikely that this species occurs in the project area (URS Greiner Woodward Clyde, 2000). The project will not have a significant impact this species.

Western Spadefoot Toad (*Scaphiopus hammondi*)

Description

The western spadefoot toad (*Scaphiopus hammondi*) ranges between 1.5-2.4 inches in length, has vertical pupils, a single black, sharp edged spade on each hind foot, and lacks a glandular boss between the eyes. Small spadefoot toad larvae feed primarily on planktonic organisms and algae, but are also known to be carnivorous, and will consume dead aquatic larva of amphibians. A related species, *Scaphiopus bombifrons*, will consume fairy shrimp. Adults eat insects, worms, and other invertebrates (CDFG, 1988).

The range of the western spadefoot toad includes the entire Central Valley and adjacent foothills, and the Coast Range from Santa Barbara County south to the Mexican border. In areas where the western spadefoot toad does occur, it is often locally abundant. Grasslands with temporary pools that support willows are optimal habitat for the western spadefoot toad, but some populations are known to occur in valley-foothill woodlands. Western spadefoot toads spend most of the year in underground burrows that they construct themselves, although some individuals may use mammal burrows. The first fall rains initiate movement to the surface. Western spadefoot movements to and from breeding ponds are rarely extensive, but individuals may travel up to several meters on rainy nights. Breeding and egg laying usually occur from late winter through March, almost exclusively in temporary ponds with willows formed by heavy winter rains. Females lay several small, irregular egg clusters that hatch within 2 weeks (CDFG, 1988). The western spadefoot toad is federal species of concern and a State species of special concern.

Presence in the Project Area

The CNDDB does not contain any confirmed sightings of this species in or adjacent to the project area. General biological surveys by DWR and focused amphibian surveys did not detect presence of this species in the project area (URS Greiner Woodward Clyde, 2000). While the land adjacent to the Merced River riparian corridor may have historically supported vernal pools, intensive agriculture has replaced this habitat type in the project area vicinity. The non-native grassland located on the southern side of the Robinson reach is intensively grazed, and has been repeatedly disced. All permanent pools within the project area are filled with predatory fish species (URS Greiner Woodward Clyde, 2000). Based on the survey results, the marginal aquatic habitat, and the abundance of aquatic predators, it is unlikely that this species occurs in the project area (URS Greiner Woodward Clyde, 2000). The project will not have a significant impact on this species.

California red-legged Frog (*Rana aurora draytonii*)

Description

The California red-legged frog (*Rana aurora draytonii*) is the largest native frog in the western United States, ranging from 4-13 cm in length. Larvae probably eat algae, and invertebrates are the most common food items of adult frogs. Larger frogs will also eat small mice and tree frogs (USFWS, 1996).

California red-legged frogs have lost 70% of their historic range in California due to habitat loss, overexploitation, introduction of exotic predators, water diversion and subsequent habitat fragmentation, overgrazing, and prolonged drought. California red-legged frogs are a federally listed threatened species and are a State Species of Special Concern. California red-legged frogs are present in 243 streams/drainages in 22 counties, primarily along the central coast of California. Within the Central Valley, only 14 drainages in the Coast Range and one drainage in the Sierra Nevada foothills are actually known to support California red-legged frogs. The most secure populations of red-legged frogs are found in aquatic sites that support

substantial riparian and aquatic vegetative cover such as cattails (*Typha*), willows (*Salix*), and bulrushes (*Scirpus*), and lack exotic predators such as bullfrogs (*Rana catesbiana*), bass (*Micropterus* spp.), and sunfish (*Lepomis* spp.) (USFWS, 1996). California red-legged frogs habitat includes coastal lagoons, marshes, springs, permanent and semi-permanent natural ponds, ponded or backwater portions of streams, and artificial impoundments such as stock ponds, irrigation ponds, and siltation ponds. Tadpoles remain in these habitats until metamorphosis occurs in the summer months (USFWS, 1997a).

California red-legged frogs are highly aquatic and spend little time away from streamside habitats. However, they may move up to one mile up or down a drainage and may wander through riparian woodlands up to several dozen meters away from the water. On rainy nights, adults may travel as far as one mile away from the water. Older adults may take shelter in mammal burrows up to several dozen meters away from the water. California red-legged frogs breed during the winter and early spring, from late November through April. Eggs are laid in a loose mass, and are usually attached to emergent vegetation near the surface of the water. Eggs hatch within 6-14 days after they are laid. Tadpoles transform into juvenile frogs in 3.5-7 months (USFWS, 1997a).

Presence in the Project Area

The CNDDDB shows no known occurrences of California red-legged frogs in or near the project area. Potential aquatic habitat for the California red-legged frog is present in scattered ponds throughout the project area. All of this potential habitat was found to have significant bullfrog populations (URS Greiner Woodward Clyde, 2000). Focused surveys for California red-legged frogs did not detect the presence of this species. Based on these surveys, the marginal aquatic habitat, and the abundance of aquatic predators, it is unlikely that this species occurs in the project area (URS Greiner Woodward Clyde, 2000). The project will not have a significant impact on this species.

Special-Status Invertebrates

Conservancy fairy shrimp (*Branchinecta conservatio*)

Description

The conservancy fairy shrimp, an anostracan, is found in cool water ponds with low to moderate amounts of dissolved solids. Pools containing conservancy fairy shrimp are seasonally astatic, filled by winter and spring rains, and usually last into June at the latest (Eriksen and Belk, 1999). *B. conservatio* has been collected November-April, when temperatures are 5-24 °C. Hatching occurs about a week after pool filling at 10 °C, and at least 19 days are required to reach maturity if water temperatures slowly increase to 20 °C. Individual *B. conservatio* may live up to 154 days. Only one cohort is produced each year, so both sexes usually disappear long before their native pools are dry. Cysts are produced in large numbers, and are relatively small (mean diameter of 0.23 mm) compared to other California fairy shrimp (Eriksen and Belk, 1999).

Conservancy fairy shrimp are found in grasslands in the northern two-thirds of the Central Valley, at elevations of 16-476 feet. Within this area, populations are even more restricted and occur in just a few fragmented localities. This limited range is within land forms that are prime areas for agriculture and urban development, which constitute the largest threat to this species (Eriksen and Belk, 1999). The conservancy fairy shrimp is a federally listed endangered species.

Presence in the Project Area

The CNDDB shows no known occurrences of conservancy fairy shrimp in or near the project area. This species is dependent upon short grass vernal pool landscapes, so it may occur in nearby grasslands but not within or directly adjacent to the project area. While the land adjacent to the Merced River riparian corridor may have historically supported vernal pools, intensive agriculture has replaced this habitat type in the project area vicinity. The non-native grassland located on the southern side of the Robinson reach is intensively grazed, and has been repeatedly disced. This species does not occur in any of the four project reaches.

Vernal pool fairy shrimp (*Branchinecta lynchi*)

Description

The vernal pool fairy shrimp, a short-lived anostracan found in cool temporary ponds with low to moderate dissolved solids. Vernal pool fairy shrimp have a wide distribution throughout California's grasslands, but are usually outnumbered by other fairy shrimp species when they co-occur. Distribution ranges from near Red Bluff in Shasta County south through most of the Central Valley continuing, via disjunct populations, south to Riverside County. Locations of vernal pool fairy shrimp typically exist between 33-951 ft in elevation although, in the South Coast Mountain region, some populations are found at elevations as high as 3,803 ft. Populations exist in small depressions in sandstone outcrops less than one meter wide; or small swales, earth slumps, in basalt flow depressions with grassy or muddy bottoms; or in unplowed grasslands. These pools are smaller than those inhabited by most fairy shrimp, except the midvalley shrimp (Eriksen and Belk, 1999). These are predominantly the California vernal pools discussed by Holland (1978).

Vernal pool fairy shrimp appear early December to early May, in pools filled by winter and spring rains. Temperatures of these pools while inhabited range between 4.5-23 °C, with low to moderate Total Dissolved Solids (48-481 ppm, mean of 185 ppm), moderate alkalinity (22-274 ppm, average of 91ppm), and a mean pH of 6.8 (range 6.3-8.5). The extensive range of the vernal pool fairy shrimp occurs mainly within landforms that are prime areas for agricultural and urban development, which constitute the largest threat to this species (Eriksen and Belk, 1999). Vernal pool fairy shrimp are a federally listed threatened species.

Presence in the Project Area

The CNDDB lists two known occurrences of vernal pool fairy shrimp near the project area. One location is east of J59, adjacent to a landfill 7 miles NNW of Merced. This location

supports a robust population of vernal pool fairy shrimp, with 96 of the 221 vernal pools containing this species in 1999. The second location is southwest of Yosemite Lake, approximately 4 miles north of Merced. Because this species is dependent upon short grass vernal pool landscapes, it is unlikely that this species occurs within the project area. While the land adjacent to the Merced River riparian corridor may have historically supported vernal pools, intensive agriculture has replaced this habitat type in the project area vicinity. The non-native grassland located on the southern side of the Robinson reach is intensively grazed, and has been repeatedly disced. This species does not occur in any of the four project reaches.

Vernal pool tadpole shrimp (*Lepidurus packardii*)

Description

Vernal pool tadpole shrimp are poorly understood notostracans, characterized by their few, similarly-sized median spines on their supra-anal plate, which are not placed on a keel, and their 35 pairs of legs (Pennak, 1989). Vernal pool tadpole shrimp are typically found in temporary ponds and swales containing clear to highly turbid water. Pools containing vernal pool tadpole shrimp are commonly found in unplowed grasslands (CNDDDB). Currently, vernal pool tadpole shrimp exist in vernal pools ranging from the north end of the Central Valley around Redding to the south Central Valley around Visalia, between the Coast Range and the Sierra Nevada. Within this range, distribution is patchy and generally clustered into vernal pool complexes.

Vernal pool tadpole shrimp appear in pools filled by fall and winter rains, re-establishing each year from diapaused (resting) cysts (King, 1996). Virtually all pools inhabited by the vernal pool tadpole shrimp fill, even during drought years (King, 1996). The patchy distribution of the vernal pool tadpole shrimp occurs on flat, developable land that has easy accessibility (Cheatham, 1976). As a result, habitat loss constitutes the largest threat to this species. Vernal pool tadpole shrimp are a federally listed endangered species.

Presence in the Project Area

The CNDDDB shows no known occurrences of vernal pool tadpole shrimp in or near the project area. This species is dependent upon short grass vernal pool landscapes, so it may occur in nearby grasslands but not within or directly adjacent to the project area. While the land adjacent to the Merced River riparian corridor may have historically supported vernal pools, intensive agriculture has replaced this habitat type in the project area vicinity. The non-native grassland located on the southern side of the Robinson reach is intensively grazed, and has been repeatedly disced. This species does not occur in any of the four project reaches.

California Linderiella (*Linderiella occidentalis*)

Description

California linderiella are an endemic species of fairy shrimp found in vernal pools that exist in unplowed grasslands with old alluvial soils underlain by hardpan or in sandstone depressions (CNDDDB). They are omnivorous, and subsist on an indiscriminate diet of bacteria, plants,

animals, detritus, and sand particles (Pennak, 1989). Pools that contain this species typically have very low alkalinity, conductivity, and TDS (CNDDB). These preferred pools are often short-lived, deep, cool, and typically contain vegetation that impedes the mixing of clays. Linderiella is a long lived anostracan, living an average of 168 days. They are often found in association with vernal pool fairy shrimp (*Branchinecta lynchi*) and sometimes Conservancy fairy shrimp (*B. conservatio*) (Eriksen and Belk, 1999). California linderiella are a federal Species of Concern.

Presence in the Project Area

The CNDDB lists one known occurrence of California linderiella near the project area, east of SR59, adjacent to a landfill 7 miles NNW of Merced. This location supports a robust population of California linderiella, with 42 of the 221 vernal pools containing this species in 1999. Because this species is dependent upon short grass vernal pool landscapes, it is unlikely that this species occurs within the project area. While the land adjacent to the Merced River riparian corridor may have historically supported vernal pools, intensive agriculture has replaced this habitat type in the project area vicinity. The non-native grassland located on the southern side of the Robinson reach is intensively grazed, and has been repeatedly disced. This species does not occur in any of the four project reaches.

Molestan blister beetle (*Lytta molesta*)

Description

Lytta species belong to the Meloid (blister beetle) family. Members of the blister beetle family are termed “blister” beetles because their bodies contain cantharidin, a substance which is capable of producing skin blisters (Borror and White, 1970; Borror et al., 1989). All adult blister beetles are phytophagous (plant eating). Some species feed generally, while other species eat only leaves or pollen (Selander, 1960). Known periods of *Lytta* adult activity range from between 1-10 months (North American average is 3.5 months). The molestan blister beetle has been collected between April 3-July 1 (Selander, 1960). For the majority of *Lytta* species, the adult activity period occurs during mid to late summer. It is not thought that individual beetles live for the entire duration of this activity period, rather that adult emergence must take place over a period of several weeks (Selander, 1960). The timing of adult emergence in *Lytta* likely varies with climactic, elevational, and latitudinal variation. It is also thought that the seasonal distribution of adult emergence is closely synchronized with the nesting period of larval hosts. Adult *Lytta* tend to be slow moving and unwary. When disturbed, they will either remain motionless or crawl away from the disturbing object.

Molestan blister beetles are known to be parasitic on ground nesting bees (San Joaquin Council of Governments, 1999), and associated with vernal pools in the San Joaquin Valley (Keeler-Wolf et al., 1998). This species is known to inhabit annual grassland, foothill woodland, and *Atriplex* scrub habitat types (San Joaquin Council of Governments, 1999), and adults have been collected from lupines (*Lupinus*) (Pinto, 2000; selander, 1960) and filaree (*Erodium*) (Selander, 1960) in the spring. In general, few, if any *Lytta* are confined to a single

species of host plant; some species show a preference for a single genus of plants, but most show a preference for plants that belong to a certain family. There is some evidence which indicates that *Lytta* feed on the same kinds of plants that their bee hosts utilize as pollen sources (Selander, 1960). The molestan blister beetle is known to occur in the Central Valley of California from Contra Costa County south to Kern and Tulare counties (Selander, 1960). Molestan blister beetles are a federal species of concern.

Presence in the Project Area

A search of the CNDDDB yielded no known occurrences of molestan blister beetles in or adjacent to the project area. However, specimens have been collected from a location approximately 6 miles north of Merced (Selander, 1960). It is difficult to assess the likelihood of this species occurring in the project area with a limited biological understanding of this species ecology. The project area itself is less likely to support the molestan blister beetle, since vernal pools of the northern claypan type no longer exist in the project area. While the land adjacent to the Merced River riparian corridor may have historically supported vernal pools, intensive agriculture has replaced this habitat type in the project area vicinity. The non-native grassland located on the southern side of the Robinson reach is intensively grazed and has been repeatedly disced. The project will not have a significant impact on this species.

Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)

Description

Desmocerus species belong to the Cerambycidae (long-horned beetle). All members of this species are herbivorous and are usually associated with a particular plant species or group of closely related species, which they depend upon as a larval food source (USFWS, 1984).

Valley elderberry longhorn beetles (VELB) range from the Sacramento River in Tehama County to the middle of the San Joaquin Valley (Barr, 1991). All or portions of 31 counties are included within the range of VELB: Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Madera, Mariposa, Merced, Napa, Nevada, Placer, Sacramento, San Benito, San Joaquin, San Luis Obispo, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, and Yuba (USFWS, 1999a). Adults have been observed at elevations of 30-3,000 feet (USFWS, 1999a).

VELB is completely dependent upon its host plant, elderberry (*Sambucus*) (USFWS, 1999a). It feeds on at least one species of elderberry, and possibly as many as three different taxa. Collection records indicate that adult VELB can be found between mid-March and early June. Specific life history characteristics for VELB are unknown, but are likely to be similar to other *Desmocerus* species (USFWS, 1984). Other *Desmocerus* species deposit eggs in bark cracks and crevices of living elderberry plants. Eggs are thought to hatch shortly after they are laid, yielding larvae that then bore into the pith of larger stems and roots. When larvae are ready to pupate, they open an emergence hole through the bark and return to the pith for pupation. Adult emergence coincides with elderberry flowering; adults are thought to feed

upon the elderberry flowers. The entire life cycle lasts about 2 years, but the length of each life stage is unknown (USFWS, 1984).

Elderberry is a common component of the remaining riparian forests and associated grasslands in California. Nearly 90% of California's riparian habitat has been lost to agricultural and urban development in the last 150 years. Little is known about the historical distribution or abundance of VELB or its food plant, but the marked reduction in riparian forests suggests that the range of VELB has been substantially reduced and fragmented (Barr, 1991).

Presence in the Project Area

A search of the CNDDDB yielded no known occurrences of VELB in or near the project area. This species is completely dependent upon its host plant, elderberry, which is abundant throughout the project area, particularly within the Robinson reach. Elderberry shrubs that occur in the Central Valley and have basal stem diameters greater than one inch are considered critical VELB habitat by the Service. Although no VELB or VELB exit holes were observed during the elderberry surveys, 135 elderberry shrubs were found within the Robinson reach of the project area. Project related impacts within the Robinson reach would result in disturbance to 87 of these shrubs. Of these 87 shrubs, 47 have at least one stem ≥ 1 inch in diameter. In accordance with the July, 1999, Service conservation guidelines for the Valley elderberry longhorn beetle, these 47 shrubs will be transplanted to an on-site location. Table 6-6 shows the stem sizes and counts of these 47 shrubs.

Table 6-6. Elderberry stem size and counts of shrubs to be transplanted

Stem size (inches)	Non-riparian stems	Riparian stems
1-3	119	56
3-5	10	10
≥ 5	8	0

The other 40 shrubs will not be impacted by the project, and the appropriate conservation measures for avoidance will be followed. The three elderberry shrubs that are present in the Ratzlaff reach were avoided during project construction in that reach. The Western Stone and Lower Western Stone Reaches contain only a few elderberry plants. Potential project related impacts to the Western Stone and Lower Western Stone elderberry plants are uncertain, since the project designs and footprints for those reaches are only in the preliminary stage. Avoidance and conservation measures will be followed as described in the Service's *Conservation Guidelines for the Valley Elderberry Longhorn Beetle*. These

mitigation measures will reduce the project related impacts to VELB critical habitat to an insignificant level.

6.4.3.2 Criteria for Determining Significance

Impacts to wildlife resources would be considered significant if they resulted in any one of the following:

- Direct mortality of federally or state listed wildlife species.
- Temporary impacts to habitat of federal or state listed wildlife species resulting in increased mortality or lowered reproductive success.
- Permanent loss of designated critical habitat for federally or state listed wildlife species.

6.4.3.3 Environmental Consequences

6.4.3.3.1 No Action Alternative

No impacts to wildlife resources would occur under the no-action alternative.

6.4.3.3.2 Proposed Robinson Reach Phase

Temporary impacts to wildlife species are expected to occur as a result of the proposed Robinson reach phase, due to a temporary loss of habitat. To reduce impacts, all avoidance and conservation measures will be followed, as outlined in Appendix J. The post-construction revegetation plan would create native riparian habitat, and the final reach would result in a more natural floodplain. These efforts will benefit wildlife species by creating a more natural riparian environment, which would benefit wildlife species.

Most special-status species are not likely to be in the Robinson reach area. Therefore, the Robinson Reach phase is not expected to affect these species. Additional protection will come from the general wildlife avoidance and conservation measures, as outlined in Appendix J.

Special-status species that may be present in the Robinson reach area will be surveyed for prior to construction. If any special status species are found, species specific avoidance and conservation measures will be followed, as outlined in Appendix J. In addition, if riparian woodrat, riparian brush rabbit, or giant garter snakes are found in the Robinson reach area, formal consultation will take place with the Service.

Species that have been found in the Robinson reach area will be avoided using the avoidance and conservation measures in Appendix J. The Robinson reach phase would impact up to 47 elderberry shrubs, totaling 203 stems greater than one inch in basal diameter, considered

critical VELB habitat by the Service. The Robinson reach phase meets the conditions established by the Service for approval under a Programmatic Biological Opinion issued to projects with relatively small effects on VELB. To reduce impacts to less than significant levels, the Robinson reach phase would comply with established conservation guidelines for the VELB dated July, 1999.

No significant impacts to any federal or State listed Endangered or Threatened wildlife species, or wildlife species proposed for listing as Endangered or Threatened are expected to occur as a result of the proposed alternative.

6.4.3.3.3 Related Actions

Prior to construction, surveys will be conducted in the Lower and Western Stone reaches for special status wildlife species. Some temporary impacts to wildlife species are expected to occur as a result of these phases, due to a temporary loss of habitat. To minimize impacts, all avoidance and conservation measures will be followed, as outlined in Appendix J. The revegetation plan will improve habitat at these project phases and would be beneficial for wildlife species.

Impacts to federal or State listed endangered or threatened wildlife species, or wildlife species proposed for listing as endangered or threatened are not expected to occur in the Lower and Western Stone reaches. All wildlife avoidance and conservation measures will be followed, as outlined in Appendix J. If special status species are found, formal consultation would commence.

6.4.4 Fish

6.4.4.1 Affected Environment

The lower Merced River has undergone extensive human induced modifications, beginning as early as the 1870's. Modifications have been made for agricultural and municipal water supply, flood control, power generation, and mining for aggregate and gold. Several dams were built to regulate flows, and extensive mining downstream of the dams has left tailings and numerous pits within the riverine corridor (DWR, 2000).

Historically, the Merced River supported spring and fall-run chinook salmon (*Oncorhynchus tshawytscha*), and occasionally steelhead trout (*Oncorhynchus mykiss*). Population declines of San Joaquin Valley fall-run chinook salmon have been attributed to the following factors: degraded channels and loss of floodplain habitat; poor gravel composition; low flows; high water temperatures; low intragravel oxygen content; predation on out migrating juvenile salmon by warm water fish such as large and smallmouth bass; and insufficient spawning habitat (CDFG, 2000).

The overall declining conditions of the aquatic habitat and the variation of conditions in the lower Merced River have resulted in widely varying population levels of fish species (FWS 1995). Salmon spawning and rearing habitat has been degraded because of low instream flow releases, which resulted in siltation, armoring and lack of spawning gravel recruitment. In major portions of the spawning reach and below, riparian vegetation has been removed because of agricultural and urban development, cattle grazing, and gravel mining. The deteriorated riparian condition along the river contributes to elevated microclimate temperature, which in turn raises water temperatures. Gravel mining in the active stream channel has removed gravel from long stretches of the spawning reach. In roughly half of the spawning reach, extensive mining has left long deep pools and/or widened the channel. These pools contribute to warming the river and provide habitat for salmon predators. Illegal harvest of upstream migrating chinook salmon has been identified as a factor limiting production in the basin. With many miles of migratory habitat that are often under low-flow conditions, salmon are particularly vulnerable to poaching. Prior to 1967, spawning escapements of fall-run chinook salmon typically averaged about 550 fish. Over the 25-year baseline period between 1967 and 1991, established by the CVPIA, the average annual number of returning fall-run chinook salmon was 4,035 fish, with run sizes from as few as 24 fish in 1990 to 24,660 fish in 1984. After accounting for sport commercial harvest, the average number of fall-run chinook salmon naturally produced in the Merced River during the baseline period was 8,976 fish (CDFG 1993).

Despite this loss and degradation of riverine habitat, the Merced River has supported a large population of fall-run chinook salmon in the San Joaquin Valley. Steelhead trout (*Oncorhynchus mykiss*, Central Valley Ecologically Significant Unit (ESU)) have been largely extirpated from the project area, but sporadically use the Merced River for spawning and rearing (USFWS 2000). A few large rainbow trout that could be returning steelhead have been reported at the Merced River hatchery. A small, remnant run persists in the Stanislaus River, a large continuous run occurs in the upper Sacramento River and its tributaries, and a few steelhead have been observed in the Tuolumne River (NMFS, 1996).

6.4.4.1.1 Special Status Fish Species

The following section describes the special-status fish species potentially occurring in the entire project area (Table 6-7), and any potential project related impacts.

Pacific lamprey (*Lampetra tridentata*)

Description

Lamprey belong to the family Petromyzontidae, superclass Agnatha. Unlike bony fish, Class Osteichthyes, agnathans are eel-like, lack jaws, have an absence of paired fins, and have cartilaginous skeletons (Moyle and Cech Jr., 1988). Pacific lamprey are anadromous and parasitic (McGinnis, 1984), and are the largest species of California lamprey, with adults attaining lengths up to 2 ft (McGinnis, 1984). Spawning occurs between April and July at

Table 6-7. Special Status Fish Which May be Present in the Project Area.

Scientific Name	Common Name	Federal Status	State Status
<i>Lampetra tridentata</i>	Pacific lamprey	Sp.of Concern	None
<i>Lampetra hubbsi</i>	Kern Brook Lamprey	Sp.of Concern	Special Concern
<i>Lampetra ayresi</i>	River lamprey	Sp.of Concern	Special Concern
<i>Acipenser medirostris</i>	Green sturgeon	Sp.of Concern	Special Concern
<i>Oncorhynchus tshawytscha</i>	Central Valley Fall/late Fall-run Chinook	Candidate	None
<i>Oncorhynchus tshawytscha</i>	Central Valley spring-run Chinook	Threatened	Threatened
<i>Oncorhynchus tshawytscha</i>	Central Valley winter-run Chinook	Endangered	Endangered
<i>Oncorhynchus mykiss</i>	Steelhead (Central Valley ESU)	Threatened	None
<i>Hypomesus transpacificus</i>	Delta smelt	Threatened	Threatened
<i>Spirinchus thaleichthys</i>	Longfin smelt	Sp.of Concern	Special Concern
<i>Mylopharodon conocephalus</i>	Hardhead	None	Special Concern
<i>Pogonichthys macrolepidotus</i>	Sacramento splittail	Threatened	None

temperatures around 15°C in riffle areas where the current is swift (Wang, 1986). Both sexes construct a gravel nest, occasionally using sandy substrates. Nests usually occur in water less than 1 m deep, and are about 21-23 inches in diameter. The eggs are slightly adhesive, and cannot maintain adhesion in rapid current; most eggs are washed into the crevices of the rocks on the downstream side of the nest. Adults die after spawning (Wang, 1986). Known spawning locations are in the upper drainages of the Sacramento-San Joaquin system, below Friant Dam on the San Joaquin River, below Nimbus Dam, and above the Howe avenue bridge crossing of the American River, below Red Bluff Dam on the Sacramento River, Napa River, below Boyes Spring Historical Park Dam on Sonoma Creek, and above the Concord Avenue bridge crossing of Walnut Creek (Wang, 1986). Egg hatching occurs in about 19 days at 15 °C. The larval (ammocoetes) stage is free-swimming or benthic in the Sacramento and San Joaquin rivers and their tributaries (Wang, 1986). Larval lamprey inhabit the mud of river backwaters, where they filter feed on algae and detritus (Moyle and Cech Jr., 1988).

Pacific lamprey have been found from Point Canoa, Baja California, north to the Bering Sea and Japan. Along the California coast, they are more abundant from Monterey northward, but have been found in the Sacramento-San Joaquin River system (Wang, 1986). Pacific lamprey are a federal Species of Concern.

Presence in the Project Area

Although Pacific lamprey typically inhabit areas further north than the Merced River, they could potentially occur in the project area. It is highly unlikely that any significant spawning by this species is occurring in the construction areas; the areas in need of restoration are relatively gravel poor. If present in the project area, Pacific lamprey ammocoetes are capable of moving from one place to another in search of suitable areas of soft mud and sand (Wang, 1986), making their relocation to a more favorable site during construction likely. Since adult Pacific lamprey spawn in gravelly substrates of rapidly flowing water, the project will have a long-term positive impact on this species.

Kern brook lamprey (*Lampetra hubbsi*)

Description

Kern brook lamprey is a non-predatory lamprey endemic to Sierran streams of the San Joaquin drainage (Moyle et al., 1996). This species has a sucking disc rather than jaws (Sonoma State University, 2000). It is assumed that this species has a life cycle similar to that of other brook lamprey species, but very little is known about its life history (McGinnis, 1984).

Kern brook lamprey are typically found in silty backwaters of large rivers in foothill regions. Ammocoetes are usually found in shallow pools and along run edges where flow is minimal, in areas between 12-43 inches in depth, and where temperatures rarely exceed 25 °C during the summer. This lamprey is typically found in sand, gravel, and cobbly substrates, whereas the ammocoetes are associated primarily with sandy substrates (Sonoma State University, 2000).

This species was initially known only from the Friant-Kern canal (McGinnis, 1984), but subsequent fish monitoring and surveys have also found this species to occur in the lower reaches of the Merced, Kaweah, Kings, San Joaquin (Sonoma State University, 2000) rivers. Most known populations located below dams and are isolated from one another (Moyle et al., 1996). The full distribution of this species is not currently well understood (Moyle et al., 1996). This species is threatened by dams and other river alterations that reduce silty backwater areas (Sonoma State University, 2000). Kern brook lamprey are a Federal Species of Concern and a State Species of Special Concern.

Presence in the Project Area

Although Kern brook lamprey are not known to occur specifically in the project area, they are known to occur in the Merced River. Avoidance and mitigation measures for this species will be incorporated into the project description, minimizing any project-related impacts. Creation of a more natural river and floodplain dynamics will result from this project, which will include runs and backwater areas. The project will have a long-term positive impact on this species.

River lamprey (*Lampetra ayresi*)

Description

River lamprey are anadromous, and feed on soft-scaled species of marine and estuarine fish (McGinnis, 1984). Spawning occurs between April and May at temperatures of 13-13.5°C, in small freshwater tributary streams of the Sacramento-San Joaquin Delta, such as the Sonoma and Napa rivers (Wang, 1986). There is no known information on egg incubation and development time, but the larval (ammocoetes) stage is known to last for several years (Wang, 1986). Larval lamprey inhabit the mud of river backwaters, where they filter feed on algae and detritus (Moyle and Cech Jr., 1988).

River lampreys are found in coastal streams from San Francisco Bay north to the Taku River and Lynn Canal in Alaska. They are also known to inhabit the upper portion of the Sacramento-San Joaquin estuary and its tributaries (Wang, 1986). River lamprey are federal Species of Concern and a State Species of Special Concern.

Presence in the Project Area

There are no known records of river lamprey being present in the project area. River lamprey typically inhabit areas much further north (Wang, 1986). The project will not have a significant impact on this species.

Green sturgeon (*Acipenser medirostris*)

Description

Sturgeons are the largest freshwater fish, with records of white sturgeon (*Acipenser transmontanus*) as large as 13 feet in length and 1300 lbs (Moyle and Cech Jr., 1988). Green sturgeon are smaller, with an average total length of 3.3 ft (McGinnis, 1984). Sturgeons feed partly by scavenging, but the majority of their diet is comprised of benthic invertebrates. Fish become a more substantial portion of the diet as an individual gets larger, which sturgeons likely prey upon at night (Moyle and Cech Jr., 1988). Sturgeon are well known for their longevity, with the largest individuals possibly 100 years old (McGinnis, 1984). Spawning occurs between spring and summer, but varies temporally with location, being slightly delayed in colder streams (Wang, 1986).

Green sturgeon has been found from Ensenada, Mexico, to the Bering Sea and Japan. Green sturgeon have been reported in San Francisco Bay, San Pablo Bay, Suisun Bay, Tomales Bay, Bodega Bay, the lower San Joaquin River, and the Sacramento-San Joaquin Delta (Wang, 1986). While green sturgeon are anadromous (Eddy and Underhill, 1969), they are more marine and seldom migrate past the estuaries of large rivers for spawning (McGinnis, 1984). Spawning locations are known in the upper Klamath River, the upper Sacramento River, and larger tributaries to the Sacramento River, such as the Feather, Yuba, and American rivers (Wang, 1986). Sturgeon are unable to tolerate modern commercial fishing and even intensive sport fishing (McGinnis, 1984). Green sturgeon are a federal species of concern and a State species of special concern.

Presence in the Project Area

There are no recent records of green sturgeon in the project area. Green sturgeon seldom migrate past the estuaries of large rivers, and typically inhabit areas much further north of the project area (McGinnis, 1984). The project will not have a significant impact on this species.

Central Valley chinook salmon (*Oncorhynchus tshawytscha*)

Description

Chinook salmon, also referred to as king salmon in California, is the most abundant salmonid in California and are the largest members of the family Salmonidae, reaching lengths of 5 feet, and weights of 126 lbs (Moyle and Cech Jr., 1988).

Spawning takes place in rivers, in areas with of loose to coarse gravel. Egg masses are buried in a shallow gravel pit (redd) constructed by the female. The female often guards her redd(s) for about 2 weeks or until she dies. Newly hatched larvae stay in the gravel pits until the yolk sac is absorbed in 2-3 weeks (Wang, 1986). The chinook salmon larvae emerge into the water column and begin feeding after the yolk sac is completely absorbed; eventually beginning their downstream migration. Juvenile chinook are drift feeders subsisting in freshwater on crustaceans and aquatic insects such as caddisflies and chironomid larvae. Once in the marine environment, their diet changes to consist primarily of *Gammarus* species, *Neomysis* species, and *Grangon* species (Wang, 1986). Chinook salmon currently only exist in a small portion of their historic range, due to an estimated 70-90% loss of spawning and rearing habitat.

Fall-run chinook salmon

Description

Fall-run chinook comprise the largest salmon run in the Sacramento-San Joaquin River system. Fall-run chinook time their spawning runs with the fall rains (McGinnis, 1984). Upward river migration begins between September and October. Since dams block the upper spawning areas, spawning occurs in the lower reaches of most rivers, streams, and tributaries of the Central Valley at elevations between 197-1,970 ft. Timing of return migration is dependant on temperature (Myers et al., 1998). Population declines of San Joaquin Valley fall-run chinook salmon have been attributed to the following factors: degraded channels and loss of floodplain habitats; poor gravel composition; low flows; high water temperatures; low intragravel oxygen content; predation on out migrating juvenile salmon by warm water fish such as large and smallmouth bass; and insufficient spawning habitat (CDFG, 2000). Fall-run chinook salmon are a federal candidate for listing under ESA.

Presence in the Project Area

The Merced River supports fall-run chinook, with an estimated 25% of the fall-run chinook salmon spawning occurring upstream of the Robinson reach (CDFG, 2000). Avoidance and mitigation measures for this run will be incorporated into the project description, minimizing

any project-related impacts. Salmonid habitat restoration is the intent of this project and the project will have a long-term positive impact on this run.

Spring-run chinook salmon

Description

Spring-run chinook salmon were historically the predominant salmon species found throughout the Central Valley. They spawned at elevations between 1,476-5,250 ft. in the upper middle reaches of the San Joaquin, American, Yuba, Feather, Sacramento, and Pit rivers. Spring-run salmon migrate upstream and spawn between April and October. Both fall and spring-run chinook look identical and are distinguished only by spawning season. Habitat loss has been caused by attenuated flow regimes due to dams and other water diversions, aggregate mining, and high temperature barriers in shallow reaches of Central Valley river systems. A significant decline in spring-run chinook salmon numbers has occurred as a result of habitat loss (Myers et al., 1998). Spring-run chinook salmon are a federally listed Threatened species and a State listed Threatened species.

Presence in the Project Area

Spring-run chinook salmon have been extirpated from the Merced River. Despite the unlikely event of this run occurring in the project area, avoidance and mitigation measures for this run will be incorporated into the project description, minimizing any project-related impacts. Salmonid habitat restoration is the intent of this project, the project will have a long-term positive impact on this run.

Winter-run chinook salmon

Description

The winter-run chinook salmon population is composed of three year classes, each of which returns to freshwater to spawn as 3-year old fish (NMFS and NOAA, 1994). Migration occurs between mid-December to mid-August, with the peak period between March and May (Fisher et al., 1994). Winter-run chinook salmon are currently restricted to the Sacramento river, and critical habitat for this run includes the Sacramento River from Keswick Dam to Chipps Island at the westward margin of the Sacramento-San Joaquin Delta, all waters from Chipps island westward to Carquinez Bridge, all waters of San Pablo Bay, and all waters in San Francisco north of the San Francisco/Oakland Bay Bridge (NMFS and NOAA, 1993). Physical and biological features required for the conservation of winter-run chinook salmon include: access from the Pacific Ocean to appropriate spawning areas in the upper Sacramento River; availability of clean gravel for spawning substrate, adequate river flows for successful spawning, egg incubation, fry development and emergence, and downstream transport of juveniles; water temperatures between 5.8 and 14.1 °C (42.5 and 57.5 °F); habitat areas and prey that are not contaminated; riparian habitat that provides for successful juvenile development and survival; and access downstream so that juveniles can migrate from upstream spawning grounds to San Francisco Bay and the Pacific Ocean (NMFS and NOAA, 1993).

Winter-run chinook salmon are a federally listed Endangered species and a State listed Endangered species.

Presence in the Project Area

Winter-run chinook salmon are restricted to the Sacramento river and its tributaries (NMFS and NOAA, 1993; Fisher et al., 1994). There are no records of winter-run chinook occurring in the Merced River, and construction activities will not occur within the river channel after the 1st of October. The project will not have a significant impact on this run, but a long-term positive impact may be realized.

Central Valley steelhead (*Oncorhynchus mykiss*, Central Valley ESU)

Description

Steelhead (also known as anadromous rainbow trout) belong to the salmon, trout, and whitefish family Salmonidae, which is the dominant family in most cold-water streams and lakes of North America and Eurasia (Moyle and Cech Jr., 1988). Their primary food is drifting insects (McGinnis, 1984).

Steelhead exhibit one of the most complex life histories of any salmonid. Steelhead may be either anadromous or lifelong freshwater residents. Freshwater resident forms are referred to as rainbow or redband trout, while the anadromous form (which migrate as juveniles from freshwater to the ocean, then return to freshwater to spawn) is referred to as steelhead. Steelhead typically migrate to marine waters after spending 2 years in freshwater. They reside in the marine environment for 2-3 years prior to returning to their natal stream to spawn (NMFS, 1996). Steelhead are capable of spawning more than once before they die. However, it is rare for steelhead to spawn more than twice before dying, and even rarer for males to do so. Steelhead adults typically spawn between December and June. Depending on water temperature, steelhead eggs can incubate in redds, or nesting gravels, for 1.5 to 4 months before hatching as alevins, the larval life stage that depends upon a yolk sac for nutrition. After the yolk sac is absorbed, alevins emerge from the gravels as young juveniles or fry and begin actively feeding. Juveniles rear in fresh water for 1 to 4 years, then migrate to the ocean as smolts (NMFS, 1996).

Historically, steelhead were distributed throughout the North Pacific Ocean from the Kamchatka Peninsula in Asia to the northern Baja peninsula. Presently, the species occurs from the Kamchatka Peninsula, east and south along the Pacific Coast of North America, to at least Malibu Creek in Southern California. The Central Valley ESU occupies the Sacramento and San Joaquin Rivers and their tributaries. The Sacramento and San Joaquin Rivers are the only migration routes to the drainages of the Sierra Nevada and southern Cascade Mountains for anadromous fish. The distance from the Pacific Ocean to spawning streams can exceed 186 miles, which provides a unique opportunity for reproductive isolation among steelhead. Steelhead once ranged throughout the tributaries and headwaters of the Sacramento and San Joaquin Rivers (NMFS, 1996). Current available information indicates that the current range

of Central Valley steelhead has been limited to the Sacramento, Stanislaus, Tuolumne, and Merced rivers, and the mainstem of the San Joaquin River up to the confluence with the Merced River. Distribution has become limited due to human alteration of formerly available habitat, including dam construction and water development (NMFS, 1996). Steelhead are a federally listed Threatened species.

Presence in the Project Area

Steelhead have been largely extirpated from the project area, but sporadically use the Merced River for spawning and rearing (USFWS January 2000). A few large rainbow trout that could be returning steelhead have been reported at the Merced River hatchery. Avoidance and mitigation measures for this species will be incorporated into the project description, minimizing any project-related impacts. Salmonid habitat restoration is the intent of this project, the project will have a long-term positive impact on this species.

Critical Habitat for Central Valley Steelhead

The project area is located within the Middle San Joaquin-Lower Merced-Lower Stanislaus Hydrologic Unit, which has critical habitat designated for the steelhead on the Merced River below the Crocker/Huffman Dam. Critical habitat for the steelhead includes the water, substrate, and adjacent riparian zone (NMFS 2000). The riparian portion of critical habitat is described in this document's vegetation section.

Delta smelt (*Hypomesus transpacificus*)

Description

Delta smelt belong to the family Osmeridae, which contains only about 10 species (Moyle and Cech Jr., 1988). Delta smelt are characterized as true estuarine fish, fish that spend their entire life cycle in estuaries. Delta smelt are the only fish of this type in the Sacramento-San Joaquin Delta (Moyle and Cech Jr., 1988). Delta smelt spawn between March and June, laying adhesive, demersal eggs in gravelly areas, such as beaches or riffles. (Moyle and Cech Jr., 1988). They are most vulnerable to capture during spawning aggregations (Moyle and Cech Jr., 1988). Delta smelt females are the least prolific of the California smelts, producing about 2,000 eggs. Their low fecundity and general semelparity leaves their population extremely vulnerable to any factors that disrupt successful spawning and rearing. Every so often, it appears that a complete spawning failure occurs, making the adults that survive to a second spawning season critical to the continued existence of this species (McGinnis, 1984).

Delta smelt are found only in the Sacramento San Joaquin estuary, where the Sacramento and San Joaquin Rivers flow into San Francisco Bay (CDFG, 1995b). They have been found as far downstream as San Pablo Bay, and as far upstream as the mouth of the American River on the Sacramento River, and Mossdale on the San Joaquin River (CDFG, 1995b). Threats to delta smelt include reductions in estuary outflow due to water management and precipitation; entrainment to water diversions; extremely high outflow; changes in available food organisms; toxic substances; disease, competition, and predation; and the loss of genetic integrity by

hybridization with the introduced wagasaki (CDFG, 1995b). Delta smelt are a federally listed threatened species and a State listed threatened species.

Presence in the Project Area

There are no known records of delta smelt being present in the project area. Delta smelt typically inhabit the Sacramento-San Joaquin estuary. The closest known upstream location for delta smelt is Mossdale, which is about 60 miles northwest of the project area (CDFG, 1995b). The project will not have a significant impact on this species.

Longfin smelt (*Spirinchus thaleichthys*)

Description

Longfin Smelt belong to the family Osmeridae, which contains only about 10 species (Moyle and Cech Jr., 1988). Smelt are generally small in size, but are voracious pelagic carnivores (Moyle and Cech Jr., 1988). They eat *Diaphanosoma* (cladoceran), *Diaptomus* and *Episcura* (copepods), mysid shrimp, and other planktonic crustaceans (Wang, 1986).

Longfin smelt are eurhaline, preferring moderately saline water. Longfin smelt live in bay waters throughout the summer, moving into the lower reaches of the rivers that flow into these bays during the fall. Spawning takes place December-June at 7-14.5°C, in lower river reaches (Wang, 1986). Females lay up to 24,000 eggs (McGinnis, 1984). Spawning occurs in freshwater sections of the lower Delta, streams near the sea, tributaries and streams of land-locked lakes, sloughs, edges of rivers, and bays. Known spawning locations occur in Suisun Bay, Montezuma Slough, the lower reaches of the Sacramento and San Joaquin Rivers, and the Delta (Wang, 1986). Spawning substrates include rocks, aquatic plants, and hard and sandy river bottoms. Eggs are deposited singly and adhere to the spawning substrate (Wang, 1986). Like Delta Smelt, most longfin smelt die after spawning, but a few remain to spawn the following year (McGinnis, 1984). Longfin smelt range from Prince William Sound, Hinchinbrook Island, Alaska south to the Sacramento-San Joaquin estuary. Longfin smelt are a federally listed Species of Concern and a State listed Species of Special Concern.

Presence in the Project Area

There are no known records of longfin smelt in the project areas. Longfin smelt typically inhabit the Sacramento-San Joaquin estuary and the lower reaches of the Sacramento and San Joaquin Rivers (Wang, 1986). The project will not have a significant impact on this species.

Hardhead (*Mylopharodon conocephalus*)

Description

Hardhead belong to the minnow or carp family Cyprinidae, which is the largest fish family with over 2,000 species (Moyle and Cech Jr., 1988). Adults eat primarily bottom dwelling invertebrates and aquatic plants (McGinnis, 1984), whereas juveniles feed on cladocerans and other plankton, insects and small snails. Juveniles will also eat filamentous algae, particularly in the fall months (Wang, 1986).

Hardhead adults and juvenile are commonly found in the pools of rivers and creeks, as well as the deeper water of lakes and reservoirs. Hardhead spawning and life history are poorly understood. Spawning has never been observed, possibly because spawning occurs in large river and foothill gorges. Based on larval and small juvenile captures, spawning occurs as early as May and June in the Central Valley, and may extend to August in the foothill regions of the San Joaquin River. Spawning substrate may include sand, gravel, and decomposed granite areas. Hardheads reach maturity at the end of their second year (Wang, 1986).

Hardhead are found only in the Sacramento-San Joaquin and Russian River systems. Adults have been commonly found below Kerkhoff Dam on the San Joaquin River, and below Red Bluff Diversion Dam on the Sacramento River. However, the overall population has been declining rapidly in their original ranges (Wang, 1986). Hardhead are a State listed Species of Special Concern.

Presence in the Project Area

Hardhead are known to occur in the vicinity of the J59 Bridge. Avoidance and mitigation measures will be incorporated into the project description, minimizing any project-related impacts. Since hardhead are thought to spawn in gravelly substrates of relatively deep water, the project will have a long-term positive impact on this species.

Sacramento splittail (*Pogonichthys macrolepidotus*)

Description

Sacramento splittail belong to the minnow or carp family Cyprinidae, which is the largest fish family with over 2,000 species (Moyle and Cech Jr., 1988). Sacramento splittail are benthic foragers, feeding on clams, crustaceans (opossum shrimp, amphipods), insect larvae, and other invertebrates (USFWS, 1999c). Splittail are long lived, frequently reaching 5-7 years of age (USFWS, 1999c). Male splittail usually reach sexual maturity by the end of their first year, and females reach sexual maturity in one or two years (Wang, 1986). Spawning behavior is associated with rising water levels, increasing water temperatures, and increasing day length. Peak spawning occurs between March and May (USFWS, 1999c), although some records indicate late January to early July (Wang, 1986). Spawning occurs over flooded vegetation of estuarine marshes, sloughs, and slow-moving reaches of large rivers (USFWS, 1999c). Eggs are demersal and adhesive (Wang, 1986). Larvae remain in willow, weedy areas close to spawning sites for 10-14 days, then move into deeper water as they mature and their swimming ability increases. In recent years, splittail have been found most often in slow moving sections of rivers, sloughs, and dead end sloughs. Because splittail require flooded vegetation for spawning and rearing habitat, splittail are often found in areas subject to flooding (USFWS, 1999c). Splittail can tolerate brackish water, which may explain their local population success in areas such as Suisun Marsh (Wang, 1986).

Historically, splittail were found in the Sacramento River at Redding, south to the present day site of Friant Dam on the San Joaquin River. Populations once existed up the Sacramento

River tributaries as far as the current site of Oroville Dam on the Feather River, and Folsom Dam on the American River (USFWS, 1999c). This species is now restricted to a small portion of its range, due to dams and water diversions restricting upstream access on the large rivers. With the exception of very wet years, this species is now mainly restricted to the Delta (tidal waters from Sacramento south to the confluence of the Stanislaus and San Joaquin Rivers in Suisun Bay), Suisun Bay, Suisun Marsh, and Napa Marsh (USFWS, 1999c). Populations also exist in the Sacramento River upstream to Knights Landing in Yolo County and in the lower reaches of all rivers tributary to the Delta. No information is currently available as to how far upstream splittail occur in the San Joaquin River (Wang, 1986). During wet years, splittail have been found in the Sacramento River at the Red Bluff Diversion Dam in Tehama County, in the main stem of the San Joaquin River below its confluence with the Merced, and in the lower Tuolumne River (USFWS, 1999c).

Because splittail concentrate in willow areas, they are particularly vulnerable to reclamation activities, such as dredging, diking, and wetland filling. Additional threats to this species include direct and indirect mortality at power plants and in-delta diversion sites; reduced river flows and changes in seasonal flow patterns in the Sacramento-San Joaquin River system; loss of spawning and rearing habitat as a result of draining and diking for agricultural purposes; loss of willow water habitat due to levee slope protection and other bank oriented construction activities; reduction in the highly productive brackish water habitat; presence of toxic substances in the aquatic habitat; human and natural disturbance in the food web due to altered hydrology and exotic species; flood control operations that strand eggs, larvae, juveniles, and adults; and drought induced increase in the severity of these effects (USFWS, 1999c). Because of these threats, the Sacramento splittail population has declined by 62 percent over the last 15 years (USFWS, 1999c). Splittail are a federally listed Threatened species.

Presence in the Project Area

There are no current records for Sacramento splittail in the project area. Since this species is mainly restricted to the Delta and associated euryhaline habitat (USFWS, 1999c), it is unlikely that splittail exist in the project area. While they have a wider distribution in wet years (USFWS, 1999c), it is unknown how far upstream splittail occur in the Merced River (Wang, 1986). However, under typical hydrologic scenarios and present day distribution of splittail, it is unlikely that splittail would travel into the project area. The project will not have a significant impact on this species.

6.4.4.2 Criteria for Determining Significance

Impacts to fish would be considered significant if they resulted in any one of the following:

- Direct mortality of federally or State listed fish species.
- Temporary impacts to habitat of federal or State listed species resulting in increased mortality or lowered reproductive success.
- Permanent loss of designated critical habitat for federal or State listed species.

6.4.4.3 Environmental Consequences

6.4.4.3.1 No Action Alternative

Without the Project, the numerous gravel extraction pits and shallow braided channels that exist in the project area would continue to strand and cause the death of juvenile and adult salmonids during periods of fluctuating flow, prevent adequate passage of up migrating salmonids; provide habitat for non-native predatory fish, have shallow unsheltered sections of river that exceed maximum temperature requirements, and have a lack of adequate spawning and rearing habitat. In addition, gravel infusions made upstream of the project area are likely to deposit in gravel pits during high flows rather than in the stream channel.

6.4.4.3.2 Proposed Robinson Reach Phase

The proposed instream construction activities have potential to temporarily impact anadromous salmonids and other fisheries and their habitats at the site-specific level. Existing instream habitat, such as pools, riffles, and spawning gravel could be disturbed or altered in the construction areas. Other construction activities, such as cofferdam construction and associated streambed alteration, would result in soil disturbance leading to temporary water quality degradation from sedimentation and increased turbidity at, and downstream of, construction sites. Water quality also could be affected due to heavy machinery operating within the streambed.

Steelhead are not likely to be present on the project site, as they are largely extirpated from the Merced River. However, avoidance and conservation measures have been incorporated into the proposed action to reduce the potential for adverse effects in the event that steelhead would be present (Appendix J). The riparian portion of critical habitat for steelhead also could be temporarily impacted due to construction activities. Construction throughout the project area will require that significant amounts of riparian vegetation be removed. Avoidance and conservation measures have been incorporated into the proposed action to reduce the potential for adverse effects on riparian habitat (Appendix J). In addition, this would be only a temporary impact, as subsequent revegetation efforts will result in larger acreage of riparian habitat than pre-project conditions. These riparian plantings would provide shade to the river and improve bank stability. The project is structured to provide no net loss to the existing riparian habitat, and is intended to produce a positive long-term gain to the future riparian environment.

The potential for impacts to fall-run chinook salmon (and steelhead, if present) would largely be avoided by limiting construction affecting the stream channels to periods when the fish are at their lowest abundance (June 1 to October 31). Spawning and incubation for fall-run chinook salmon and steelhead occurs outside of the construction windows and, therefore, spawning and incubation should not be affected. Other avoidance and conservation measures also have been incorporated into the proposed action to reduce the potential for adverse effects (Appendix J). For example, instream project construction would occur for a short

duration in summer and early fall during low flow periods and would incorporate to control erosion and protect water quality.

Spring-run chinook salmon are thought to be largely extirpated from the Merced River and there are no records of winter-run chinook occurring in the Merced River. Despite the unlikely event of spring-run or winter-run chinook salmon occurring in the project area, avoidance and conservation measures incorporated into the project description (Appendix J) should minimize the potential for any project-related adverse effects. If spring-run or winter-run chinook salmon are observed in the project area during construction, instream work will halt, and NMFS will be contacted.

Although Pacific lamprey typically inhabit area further north than the Merced River, they potentially could occur in the project area. It is highly unlikely that any significant spawning by this species is occurring in the construction areas, as the areas in need of restoration are relatively gravel poor. If present in the project area, Pacific lamprey ammocoetes are capable of moving from one place to another in search of suitable areas of soft mud and sand (Wang 1986), making their relocation to a more favorable site during construction likely. Since adult Pacific lamprey spawn in gravelly substrates of rapidly flowing water, the project may have a long-term positive impact on this species.

There are no known records of river lamprey being present in the project area. River lamprey typically inhabit areas much further north (Wang 1986). Therefore, the project should not have an adverse impact on this species.

Other special status species, except hardhead (i.e., green sturgeon, Kern Brook lamprey, Delta smelt, longfin smelt, and splittail), are not likely to occur within the Robinson Reach. In the unlikely event that any of these species would be present, avoidance and conservation measures (Appendix J) would minimize the potential for adverse effects. Delta smelt, longfin smelt, and splittail, which occur downstream in the Delta, are not expected to be affected by actions of the Robinson Reach phase. Impacts to hardhead would be minimal due to avoidance and conservation measures (Appendix J). Filling gravel extraction pits within and adjacent to the stream channel would greatly reduce stranding of juvenile salmonids and would also reduce the amount of habitat available to exotic predatory fish (bass and sunfish) that prey on fry and juvenile salmonids.

6.4.4.3.3 Related Actions

At the overall project level, proposed actions would be implemented in a phased approach as site-specific needs are identified, designs are completed, funding is acquired, and site-specific environmental compliance is completed. Potential impacts for all phases of the project include temporary impacts to anadromous salmonids and other fisheries and their habitats. Existing instream habitat, such as pools, riffles, and spawning gravel, could be disturbed or altered in the construction areas. Other construction activities, such as cofferdam construction and associated streambed alteration, would result in soil disturbance leading to

temporary water quality degradation from sedimentation and increased turbidity at, and downstream of, the construction sites. Water quality could be affected due to heavy machinery operating within the streambed. The riparian portion of critical habitat for steelhead also could be temporarily impacted due to construction activities. Potential adverse effects to anadromous fish and critical habitat for steelhead as a result of the project are described above for the Robinson Reach phase.

However, avoidance and conservation measures similar to those defined for the proposed Robinson Reach phase (Appendix J) would be incorporated into the Lower and Western Stone phases to reduce the potential for incidental adverse effects. In addition, the phased approach to the project would spread any incidental adverse effects over time, such that the temporary and minor adverse effects that may occur at construction sites would not be expected to substantially accumulate throughout the project area. The monitoring programs and adaptive management process established for the project phases would provide opportunity to correct adverse conditions that could result from project actions.

The potential benefits to chinook salmon and steelhead should outweigh any incidental, short-term adverse effects at project sites. Expected benefits include, but are not limited to, restoration and maintenance of spawning areas, improvement of stream channel and flood plain dynamics, revegetation of native woody riparian species, isolation of salmon predator habitat, and increased in-stream production of fall-run chinook salmon and steelhead in the lower Merced River. Improved gravel substrates should increase production of aquatic invertebrates and, therefore, the food base available for juvenile salmonids. Enhancement of associated riparian habitats also should benefit critical habitat throughout the project area.

Other special status species, except hardhead (i.e., green sturgeon, Kern Brook lamprey, Delta smelt, longfin smelt, and splittail), are not likely to occur within the Lower Western Stone and Western Stone reaches of the project area. In the unlikely event that any of these species would be present, avoidance and conservation measures (Appendix J) would minimize the potential for adverse effects. Delta smelt, longfin smelt, and splittail, which occur downstream in the Delta, are not expected to be affected by the project. Impacts to hardhead would be minimal due to the avoidance and conservation measures. Potential filling of gravel extraction pits within and adjacent to the stream channel in the Lower Western Stone and Western Stone reaches of the project area may greatly reduce stranding of juvenile salmonids and may also reduce the amount of habitat available to exotic predatory fish (bass and sunfish) that prey on fry and juvenile salmonids.

6.5 Recreation and Public Safety

6.5.1 Affected Environment

The adjacent river property along both sides of the 2-mile section of the project area is privately owned, restricting public access to the river. If allowed by the landowner, most recreation taking place in the project area is onshore fishing, picnicking and limited hiking. Within the project area, motorized boat access is difficult due to the shallow, moderately swift water and lack of boat launching and access facilities. Conditions are more conducive to canoeing, rafting, inner-tube floating and other non-motorized boating that does not require water depths greater than 2 feet.

6.5.2 Environmental Consequences

No Action Alternative

The recreational opportunities and public safety concerns would not be affected under the no action alternative.

Proposed Robinson Reach Phase

Project activities only would occur on weekdays because most recreational use within the project area takes place on weekends and holidays. Short-term impacts on recreational opportunities are likely due to construction and transport activities, which would impede use in the immediate vicinity of the sites and would create short-term public safety concerns for recreationists such as canoeists and anglers. If construction activities occur in areas available to public access, these areas would be temporarily restricted for public use during construction periods for safety concerns.

6.6 Socioeconomic conditions and land use

6.6.1 Affected Environment

The land adjacent to this reach of the river is rural and privately owned and the primary land use is agricultural and aggregate mining. Many tracts in the immediate area are under active cultivation with orchards and vineyards and several actively grazed annual grassland pastures abut the river's edge in the vicinity of the project area. Most of the residences located within the rural setting of the project area are associated with agricultural holdings and operations. There is currently an expansive gravel mining plant on the north section of the lower Merced River.

6.6.2 Environmental Consequences

No Action Alternative

Socioeconomic and land use conditions and issues would not be affected under the no action alternative.

Proposed Robinson Reach Phase

Under the proposed alternative, the project would be funded via cost sharing by the Delta Pumping Plant Fish Protection (Four-Pumps) Agreement (\$3,233,800), the Service's CVPIA AFRP (\$1,000,000), USBR/CDFG Tracy Fish Facility Direct Loss Mitigation Program (\$250,000), CDFG (\$250,000), and CALFED restoration funds (\$3,142,101). Gravel would be purchased locally and placed by local contractors, providing income to the local economy. Stabilizing salmonid spawning habitat could increase spawning in the river and should contribute to the long-term goal of increasing natural populations of salmonids in the Merced River. Restoration and increased salmon and steelhead production would have long-term economic and intrinsic community benefits. In addition to this short-term employment opportunity and long-term intrinsic community benefits, the potential increases in anadromous fish production would have a positive, long-term affect on the regional commercial and sport fishery industries. The level of this effect cannot be quantified. In addition, general socioeconomic conditions avoidance and conservation measures will be followed as outlined in Appendix J.

6.7 Cultural Resources

6.7.1 Affected Environment

The cultural resource study of the affected environment for this project included a record search at the California Historic Resources Information System (CHRIS) and a field survey of the project area. The record search was completed by CHRIS Central California Information Center staff on May 5, 1999. The record search included a review of the National Register of Historic Places, the California Register of Historical Resources, the California Inventory of Historic Resources, the California Historical Landmarks, the California Points of Historical Interest, the Historic Property Directory, the Caltrans Local Bridge Survey, the Survey of Surveys, GLO Plat maps, archaeological site and survey maps, and archaeological site and survey reports.

The CHRIS search revealed that no previous cultural resources or cultural resource surveys have been documented for the project area. However, located within a 1/4 mile radius of the project area are five historic-era cultural resources: unrecorded segment of the Yosemite Valley Railroad; a bridge; two old road segments; and fences.

A pedestrian field survey of the project area was conducted in August, 2000 by DWR Associate State Archaeologists. Because the project area is situated entirely within the active and old steam bed of the Merced River and its floodplain, intensive survey was not warranted. Thus, the project area was covered using an intuitive survey strategy, including cursory coverage of the streambed, and more intensive coverage of areas with more likelihood for resources such as the river banks, islands, and floodplains.

One cultural resource was located within the project area. The resource consists of pier remains from the Yosemite Valley Railroad. The remains include 6 cylindrical concrete piers 25 feet in height, and 26 wooden posts ranging from 6 inches to 10 feet in height. The cylindrical concrete piers have wooden log centers, and were encased in sections of riveted sheet iron. The piers have severely deteriorated; two of the piers have fallen into the stream bed, and approximately 95% of the outer iron sheeting was previously removed. In addition, sections of the concrete are breaking off and eroding. The resource was recorded on the appropriate Department of Parks and Recreation forms and submitted to the CHRIS Central California Information Center for processing.

6.7.2 Criteria for Determining Significance

Cultural resource significance is evaluated in terms of eligibility for listing in the National Register of Historic Places (NRHP). NRHP significance criteria applied to evaluate the cultural resources in this study are defined in 36 CFR 60.4, as follows:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that:

- a. are associated with events that have made a significant contribution to the broad patterns of our history;
- b. are associated with the lives of persons significant in our past;
- c. embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; possess high artistic values; or represent a significant and distinguishable entity whose components may lack individual distinction; or
- d. have yielded, or may be likely to yield, information important in prehistory or history.

Due to lack of integrity, the Yosemite Valley Railroad pier remains located in the project area are considered ineligible for listing in the NRHP. The piers are severely deteriorated (two of them have tumbled into the river bed), and there is no remaining superstructure, rail bed, trestle, track, or ties.

6.7.3 Environmental Consequences

6.7.3.1 No Action Alternative

Historic properties would not be affected under the no action alternative.

6.7.3.2 Proposed Robinson Reach Phase

If the planned activities change, or if during construction any cultural resources are encountered, all work in the area of the discovery would be halted until appropriate consultation. Appendix G outlines the results of the cultural resources survey for the Robinson reach phase.

7.0 CUMULATIVE IMPACTS

The Robinson reach action is Phase II of four phases, comprehensively called the Merced River Salmon Habitat Enhancement Project. The entire project would take place on four adjoining river reaches between River Miles 40.0 and 44.4. Implementation of this four reach restoration project would follow the order of Ratzlaff, Robinson, Lower Western Stone and Western Stone. The Ratzlaff reach action was completed in October, 1999. The objective for the Ratzlaff reach was to isolate the large gravel pit from the river, create a wider low flow channel, create a wider floodplain, and create a more naturally functioning river. Construction on the Ratzlaff reach began on June 21, 1999, and was completed in mid-October 1999. Construction in this reach eliminated approximately 45 acres of salmonid predator habitat, and utilized approximately 460,000 cubic yards of gold dredger tailings obtained off-site. Intensive revegetation efforts are currently underway in this reach.

In order for channel and floodplain reconfiguration to occur within this reach, much of the riparian vegetation had to be removed. Islands of mature trees were left in place where possible, and a vigorous long-term revegetation effort is currently underway. Project-related impacts to the elderberry cluster in this reach were avoided. A detailed project description and impact analysis can be found in the Environmental Assessment for the action (USFWS January 2000).

The collective Merced River Salmon Habitat Enhancement Project (Project) would modify and enhance 4.4 miles of the natural salmon spawning area remaining below Crocker-Huffman Dam (Dam). Approximately 25 percent of the natural salmon spawning within the Merced River occurs between the project site and the Dam (F. Jurick, personal communication). Because the Project would be implemented in a phased approach, site-specific impacts would be spread over time. Because only part of the work would be implemented in any one year, and all phases would incorporate appropriate mitigation and conservation measures, the temporary and minor adverse effects that may occur at construction sites would not be expected to substantially accumulate throughout the watershed. Cumulative actions to improve stream corridor habitats throughout the Project Area are expected to provide long-term benefits to associated vegetation and wildlife. Because vegetation communities and wildlife habitats within the Merced River watershed have been substantially modified to suit human land uses and will likely continue to be modified as human populations increase, cumulative benefits from proposed actions over time may be partially offset with new adverse impacts in the watershed.

Other related activities aimed at salmonid production, enhancement, restoration and mitigation are being planned and/or implemented for the Merced River system and Central Valley under directives of CVPIA legislation, CALFED, and the State of California's anadromous fish program. Implementation of various AFRP, CALFED and State habitat restoration activities would be phased depending on available funding. Potential salmon habitat improvement projects occurring in watersheds throughout the Central Valley include screening water diversions, water acquisition, improving fish passage, riparian habitat restoration and other enhancement actions. The potential actions are general in nature and often do not address the specifics of an action in terms of magnitude and extent of implementation, because the program relies on willing stakeholder participation. Developing more-specific implementation strategies for individual projects would require a combination of phased implementation and monitoring.

The magnitude of effects under current and other potential salmonid habitat improvement actions are undeterminable at this time. However, those currently outlined in the Final Restoration Plan for the Anadromous Fish Restoration Program, if considered together, and if successful, these actions are designed to double salmon populations in the Central Valley to levels not less than the average annual escapements from 1967 to 1991. Because historical water development projects have affected the natural geomorphic and hydrologic river conditions, and if these activities continue as in the past, the potential environmental gains of this project and other related habitat improvement actions may be reduced.

8.0 CONSULTATION AND COORDINATION

The CDFG is the lead agency cooperating with DWR for the Robinson reach phase and would be responsible for implementing project-related actions. Development of the proposal was a collaborative effort by the interagency Four Pumps Committee, DWR and CDFG, with input from the Service. These agencies are also responsible for coordinating regulatory compliance, and obtaining permits and approvals for the proposed Robinson reach phase. Further description of required consultation and coordination are described in the following sections.

The DWR and CDFG are jointly responsible for preparing the Initial Study and Negative Declaration, which would assess the impacts of the Robinson reach required by CEQA and the State CEQA Guidelines. The Service is responsible for preparing the Environmental Assessment under the National Environmental Policy Act. The joint environmental document will be reviewed by appropriate regulatory agencies and will be available for public review.

8.1 State Role

CEQA requires the preparation of environmental impact reports for projects proposed or permitted by state or local agencies, with the potential to impact the environment. Its policies

include specific protection of species designated as threatened or endangered. The Sacramento-San Joaquin Delta is listed as having regional and statewide significance; wetlands and riparian lands are defined as significant. Impacts must be mitigated to a level of non-significance (or a finding of overriding consideration), and there must be a mitigation and monitoring plan to ensure the effectiveness of mitigation measures.

The California Endangered Species Act (CESA) controls take of State listed threatened or endangered species. The Act requires state agencies to consult with DFG on projects with the potential to affect State listed species and to implement measures to minimize project impacts to the listed species.

The DFG has legislative authority to preserve, protect, and manage the State's fish, wildlife, and vegetation. DFG administers provisions of the CESA. DFG is responsible for wildlife management, collecting and managing data for waterfowl and nongame wildlife, wetland enhancement, habitat development and management on other public lands.

Several provisions in the State Fish and Game Code provide an important basis for the protection of fish and wildlife. Sections 1600-1607 require a Streambed Alteration Agreement with DFG for projects that affect the flow, bed, channel or bank of any river, stream, or lake. Protective measures for fish, wildlife, and water quality are included in these agreements. Section 2760 et. seq. provides policy relative to protection and restoration of the State's fisheries and makes significant findings relative to the impacts caused by water development. The Keene-Nielsen Fisheries Restoration Act of 1985 states that California intends to make reasonable efforts to prevent further declines in fish and wildlife, intends to restore fish and wildlife to historic levels where possible, and intends to enhance fish and wildlife resources where possible. Section 5650 prohibits the placement of any substance or material deleterious to fish, plant, or bird life into waters of the State. Section 1505 of the Code gives DFG the authority to manage, control, and protect the portions of designated salmon spawning reaches that occupy State-owned lands to the extent necessary to protect fishlife in these areas. All of the major salmon spawning reaches of Central Valley streams are designated for protection in this code section.

The Salmon, Steelhead Trout, and Anadromous Fisheries Program Act of 1988 has been incorporated into Fish and Game Code Sections 6900-6924. The California Legislature declared as follows: a) It is the policy of the State to significantly increase the natural production of salmon and steelhead trout by the end of this century. DFG shall develop a plan and a program that strives to double the current natural production of salmon and steelhead trout resources. b) It is the policy of the State to recognize and encourage the participation of the public in privately and publicly funded mitigation, restoration, and enhancement programs in order to protect and increase naturally spawning salmon and steelhead trout resources. c) It is the policy of the State that existing natural salmon and steelhead trout habitat shall not be diminished further without offsetting the impacts of the lost habitat.

The Fish and Game Commission (FGC) sets policy for the DFG. Several Commission policies, adopted pursuant to Section 703 of the Fish and Game code, have widespread importance for the protection of fish and wildlife species in the Central Valley. The Commission's Water Policy describes specific actions that DFG shall take to provide maximum protection and enhancement of fish and wildlife and their habitat. The Commission's policy on wetlands is to provide for the protection, preservation, restoration, enhancement, and expansion of wetland habitat in California. Further, it is the policy of the Commission to strongly discourage development in or conversion of wetlands. It opposes consistent with its legal authority, any development or conversion that would result in a reduction of wetland acreage or wetland habitat values. The Commission supports project mitigation that assures there will be "no net loss" of either wetland habitat values or acreage.

The mission of the DWR is to evaluate present and projected needs for water and development programs and assure the best use of the resource, to protect the public through water quality improvement, flood control and dam safety programs, and to assist local water agencies with funds, expertise, and technical support to improve their water delivery systems. DWR is responsible for the State Water Project (SWP). DWR also administers the legislatively-mandated San Joaquin River Management Program (SJRMP) in the San Joaquin River basin. The mission of this interagency program is to develop consensus solutions to fishery, water supply, water quality, flood control, wildlife, and recreation problems in the basin. All Federal, State, and local agencies with jurisdiction over the basin's resources participate in this process.

The Reclamation Board (RB), administratively part of DWR, exercises responsibilities for flood management on the Sacramento and San Joaquin rivers and their tributaries, and participates with the federal government in the completion of federal levee and channel flood control projects.

The State Water Resources Control Board (SWRCB) administers California's system of water rights and controls water quality. Authority is delegated to the Regional Water Quality Control Boards for implementation of the Clean Water Act and Porter-Cologne Act provisions. The SWRCB is charged with establishing water quality standards for the Central Valley Project and the State Water Project. The SWRCB reviews applications for the diversion of water from the Delta or its tributaries to determine the effect of the proposal on the quantity and quality of water, and the resultant effect on other uses of water in the Delta. The SWRCB is also chiefly responsible for implementing Section 208 of the Clean Water Act, the mandate to control "non-point" pollution. The State and Regional Water Quality Control boards review all proposed activities in the Delta that require federal grants, licenses, or permits to determine the effect of the proposed action on water quality. Several sections in the State Water Code refer to the protection of fish and wildlife.

The Regional Water Quality Control Boards (RWQCB) act as agents of the SWRCB and the EPA by issuing waste discharge permits. The Central Valley RWQCB jurisdiction includes the Delta from Chipps Island east and the Central Valley.

The State Lands Commission (SLC) administers policies established by the Legislature and the SLC for the management and protection of lands that the state received from the federal government upon its entry into the Union. Such lands include the beds of all naturally navigable waterways such as major rivers, streams and lakes, tide and submerged lands which extend from the mean high tide line seaward to the three-mile limit, swamp and overflow lands, vacant school lands, and granted lands. The State holds its sovereign lands in trust and they can no longer be sold. The SLC manages the resources in a manner consistent with the public trust values for fisheries, navigation, public access, recreation and wildlife habitat and open space. The SLC requires a Land Use Permit or Lease for activities on its lands.

The Office of the Secretary of Resources (OSR) directs the State Resources Agency which functions as an “umbrella” agency, setting major resource policy for the State and overseeing programs of agency departments including DWR and DFG. The agency evaluates CEQA documents for consideration of existing State policy, programs, and plans and coordinates all State agency comments on applications for Corps permits in the Delta.

Local water districts serve the water supply needs of users within specific geographic areas. Many are responsible for making instream flow releases or maintain habitat or fish and wildlife related facilities on the streams of the Central Valley used by anadromous fish.

Local governments are required to have a general plan with mandated elements including open space/conservation, safety, land use, and circulation. The conservation element addresses the conservation, development, and utilization of natural resources, including water, forests, soils, rivers, and other waters, harbors, fisheries, wildlife, minerals, and other natural resources.

8.2 Federal Role

The National Environmental Policy Act (NEPA) requires federal agencies to prepare detailed environmental impact statements when considering major federal actions that could significantly affect the quality of the human environment.

The National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470f), provides for the protection, preservation and consideration of historic and archaeological resources on Federal lands, or lands potentially effected by Federal actions, pursuant to Section 106 of the NHPA. The historic preservation review process is mandated by Section 106 outlined in regulations issued by the Advisory Council on Historic Preservation. These regulations, codified at 36 C.F.R. Part 800, include identification of historic properties in the area of potential effects, assessment of adverse and resolution of adverse effects. The CEQA requires a lead agency to

determine whether a project may have a significant effect on historical resources. A project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment (CEQA Section 21084.1). If it is determined that a proposed action will have an adverse effect on an historic resource, prudent and feasible measures eliminating or mitigating the adverse effects shall be adopted (PRC 5024.5). Cultural Resources are further covered in section 6.7 and in Appendix G.

A formal intra-Service section 7 consultation under the ESA is currently in progress to determine if implementing the Robinson reach phase would have any adverse affects on listed species. An informal interagency section 7 consultation under the ESA with NMFS also is in progress. The findings of both the intra-Service consultation and the interagency consultation will be documented in the final IS/EA.

The Fish and Wildlife Coordination Act (FWCA; P.L. 85-624) requires that federal action agencies consult with the U.S. Fish and Wildlife Service (Service) with a view to preventing loss of, and damage to, fish and wildlife, and that consistent with primary project purposes, provide for conservation, maintenance, and management of fish and wildlife and their habitats. The FWCA further provides that wildlife conservation shall receive equal consideration and be coordinated with other project features through effectual and harmonious planning, development, maintenance, and coordination of wildlife conservation. The Service's FWCA Report will be included in the final IS/EA.

The mission of the National Marine Fisheries Service (NMFS), Department of Commerce, is to conserve, manage, and develop living marine resources and to promote the continued use of these resources for the nation's benefit. The NMFS administers the ESA for Federally listed threatened or endangered anadromous fish species and marine species. In the Central Valley, NMFS has responsibility for the federally listed threatened Sacramento River winter-run chinook salmon, spring-run chinook salmon, and steelhead trout.

The mission of the U.S. Army Corps of Engineers (COE), Department of Defence, is to develop, control, maintain, and serve the nation's waterways and wetlands. The COE plays a significant role in flood control. The COE is the principal federal agency involved in the regulation of wetlands, and shares a lead role with the Environmental Protection Agency in preventing degradation and destruction of "waters of the U.S. (Most freshwater, wetlands, estuaries, and coastal waters within the territorial limits). The COE has authority under Section 404 (Clean Water Act) and Section 10 (Rivers and Harbors Act), which prohibit the discharge of dredged or fill material into waters of the U.S., or the obstruction or alteration of navigable waters of the U.S., without a permit.

The U.S. Fish and Wildlife Service (Service), Department of the Interior, is responsible for protecting and serving fishes, wildlife (birds and most mammals), and their habitats for the

benefit of the public. The Service is the natural resource trustee for migratory birds, certain anadromous fish, endangered species, and certain federally managed water resources. Under the FWCA, the Service reviews COE Section 10 and 404 permit applications, and federally permitted for constructed projects in or near wetlands with the goal of protecting and restoring the fish and wildlife values.

The Environmental Protection Agency (EPA), Executive Branch, was established to protect, maintain, restore, and enhance environmental quality and human health through the regulation of activities that have potentially harmful effects on air, water, and land resources. EPA exercises authority through the National Pollution Discharge Elimination System (NPDES), National Pretreatment Program, Ocean Dumping/Dredging and Fill, and has delegated to the states the authority to certify that permitted actions are consistent with the State's water quality objectives under the Clean Water Act.

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Steven P. Cramer, and Andrea Phillips. S.P. Cramer & Associates, Inc. currently in production.

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ENVIRONMENTAL CHECKLIST FORM

1. Project Title: Merced River Salmon Habitat Enhancement Project

2. Lead agency name and address: California Department of Fish and Game
1234 E. Shaw Ave.
Fresno, CA 93710

3. Contact person and phone number: Ms. Rhonda Reed (559) 243-4017 ext. 242

4. Project location:

The Project Area is located between river miles 40.4 and 44.4 on the Merced River in Merced County, California, approximately 4 miles downstream from the town of Snelling. The Route 59 bridge bisects the Project Area approximately in half.

5. Project sponsor's name and address: Ms. Rhonda Reed
California Department of Fish and Game
1234 E. Shaw Ave.
Fresno, CA 93710

6. General plan designation:

7. Zoning: Agricultural

8. Description of project:

The Merced River Salmon Habitat Enhancement Project targets the Merced River floodplain between river miles 44.4 and 40.0 for intensive restoration. The Project will be designed and constructed in several places over several years. The different phases will be designed using identical methodologies to ensure that each phase is compatible and functions as a whole. The goal is to have a continuous, sustainable riverine system for the entire 4.4 miles that the Project encompasses.

Specific issues addressed by the Project will vary slightly within each reach, depending upon the severity and type of disturbance that exists in each area. The Project Area is Divided into 4 reaches: Ratzlaff Reach (river miles 40-40.5), Lower Western Stone Reach (river miles 40.5-41.3), Western Stone (river miles 41.3-42.1), and Robinson Reach (river miles 42.1-44.4). Some or all of the following actions may be included during project phases: unnatural instream ponds will be filled and deepwater pools adjacent to the active channel will either be filled or isolated with setback berms; spawning gravel will be added and spawning beds reconfigured to include riffles, runs and pools; the active channel will be reconfigured to conform with the present flow regime by reconstructing meander belts and a widened floodplain; native riparian and seasonally inundated vegetation will be used to revegetate the floodplain and river corridor surfaces; and project goals and values will

be maintained through land conservation agreements coupled with monitoring plans and adaptive management. Each phase is briefly described below in the order each reach will be completed. Detailed Project Area maps are found in the attached initial study.

Ratzlaff Reach (Rivermile 40-40.5)

The intent of the Ratzlaff reach of the Project was to isolate a large gravel pit from the river channel, and to extend and revegetate the floodplain. This reach of the river was very constricted by levees and berms, limiting the river width to approximately 50 feet or less in some areas. In early 1997 the remaining berm failed, causing the river to flow through the deep gravel pit.

The goal for the Ratzlaff Reach was to isolate the large gravel pit from the river, create a wider low flow channel, create a wider floodplain, and to create a more naturally functioning river. Construction on the Ratzlaff Reach began on June 21, 1999, and was completed in mid-October 1999 (work within the wetted channel ceased by October 1 to allow Fall-run chinook salmon passage). Construction in this reach eliminated approximately 45 acres of salmonid predator habitat, and utilized approximately 460,000 cubic yards of gold dredger tailings obtained off-site. Intensive revegetation efforts are currently underway in this reach. A detailed project description, alternatives, and impact analysis can be found in the *Environmental Assessment, Anadromous Fish Restoration Program, Merced River Salmon Habitat Enhancement Project, Ratzlaff Reach Site* (USFWS January 2000).

Robinson Reach (Rivermile 42.1-44.4)

This is the largest reach included in this project, spanning over 2 miles in length. This reach was initially divided into 2 separate reaches (Permit #307 and Robinson Ranch), but has since been merged together and will be collectively referred to as the Robinson Reach. These two reaches were joined into one reach because it was more economically and logistically feasible for construction and planning to cover this entire area simultaneously. This reach has several gravel pits that provide habitat for non-native warmwater fishes, a highly braided channel, several abandoned channels, and exhibits sheet flow in areas that lack a defined channel. The channel, previous to the 1997 flood and consequent abandonment of the channel, supported 20-25% of the natural spawning of Fall-run chinook salmon. The lack of a defined channel made it necessary for CDFG to cut an emergency channel through the area to allow for Fall-run chinook salmon passage.

Approximately 12,200 feet of channel will be modified to create: 21,900 yds² of spawning habitat; incorporation of spawning riffles, runs, and pools; and a meander that fits the current flow regime. Approximately 64.9 acres of salmonid predator habitat will be removed by filling instream ponds. The floodplain would be enhanced and revegetated with native riparian plant species, increasing the available riparian habitat in the area. Several scour channels will also be constructed, which are

intended to act as seasonal wetlands. An estimated 1 million tons of on-site material will be manipulated during construction. Construction in this reach will require two full summer seasons. Construction is scheduled to begin in May 2001 and will likely run through to September 2001, will resume in May 2002, and will be completed in September 2002.

Lower Western Stone Reach (Rivermile 40.5-41.3)

This reach is scheduled to have the design and engineering finalized by September 2002, all environmental documentation (including a tiered site specific IS/EA) and permitting finalized by December 2002, construction completed by October 2003, and ongoing revegetation and monitoring after construction. This phase will consist of filling instream ponds and isolating adjacent ponds with setback berms. The project will add spawning gravel and reconfigure spawning beds to include riffles, runs and pools. The active channel would be reconfigured, meander belts would be reconstructed, and the floodplain would be widened to accommodate bankfull flows of up to 1,700 cfs. Revegetation of native riparian plants along the floodplain and adjacent uplands will also be a part of this phase of the project.

Western Stone Reach (Rivermile 41.3-42.1)

Construction within this reach is expected to be implemented concurrently with the Lower Western Stone Reach. This phase will consist of filling instream ponds and isolating adjacent ponds with setback berms. The project would add spawning gravel and reconfigure spawning beds to include riffles, runs and pools. The active channel would be reconfigured, meander belts would be reconstructed, and the floodplain would be widened to accommodate bankfull flows of up to 1,700 cfs. The project will also avoid negative impacts to special status species and develop physical and biological monitoring plans. Revegetation of native riparian plants along the floodplain and adjacent uplands will also be a part of this project phase.

9. Surrounding land uses and setting:

The Project Area is characterized by low gradient stream patterns and abandoned floodplain terraces. Adjacent areas have been developed for agricultural uses, such as row crops, cattle grazing, and orchard crops. Removal of riparian vegetation to facilitate these agricultural practices has resulted in only a narrow strip of riparian vegetation occurring along the incised river channel. The narrow riparian habitat and floodplain have been further disturbed by intensive aggregate mining.

10. Other public agencies whose approval is required:

California Department of Fish and Game

- California Endangered Species Act Incidental Permit
- Streambed Alteration Agreement

California Department of Water Resources

- Providing funding through Four Pumps Agreement

- Engineering Design

Reclamation Board

- Encroachment Permit

Army Corps of Engineers

- Clean Water Act, Section 404/401 Permit

State Mining and Geology Board

- Letter confirming that Project is not subject to Surface Mining and Reclamation Act (SMARA), since excavated materials will be used on-site, and mined, materials imported from off-site will come from SMARA compliant mines

California State Lands Commission

- Permit if Project falls under leasing jurisdiction

California Regional Water Quality Control Board

- Waiver of Waste Discharge Requirements or Waste Discharge Permit

U.S. Fish and Wildlife Service

- Incidental Take Permit for Valley Longhorn Elderberry Beetle critical habitat

CalFed

- Providing funding

Anadromous Fish Restoration Program

- Providing funding

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

	Land Use and Planning		Transportation/Circulation		Public Services
	Population and Housing	x	Biological Resources		Utilities & Service Systems
	Geological Problems		Energy & Mineral Resources		Aesthetics
x	Water		Hazards		Cultural Resources
	Air Quality		Noise		Recreation
		x	Mandatory Findings of Significance		

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

	I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
X	I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A NEGATIVE DECLARATION will be prepared.
	I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
	I find that the proposed project MAY have a significant effect(s) on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets, if the effect is a "potentially significant impact" or "potentially significant unless mitigated". An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

Signature: W. E. Loudermilk

Date: 1/29/01

Printed name: W. E. LOUDERMILK

For:

ENVIRONMENTAL DISCUSSION

The following information further explains some of the Environmental Checklist items. Items that are self-explanatory or not applicable to this project are not included in this discussion.

I. Land Use and Planning.

- a) Because the project involves improving river and floodplain dynamics in an area that is currently occupied or scoured by the Merced River and is privately owned, no impact will occur.
- b) Project design, construction, mitigation, and operation will be done in coordination with the appropriate State, federal and local entities, therefore, no impact is anticipated.
- c) Currently, the surrounding land use is designated agricultural. No impact or change to the surrounding land use as a result of this Project is anticipated.
- d) Although the Project Area is surrounded by agricultural land, construction will only take place on the river bottom, terraces, and existing berms. This Project will help benefit agricultural land by preventing the river scour of grazing land on the bluffs at the southern edge of the Robinson Reach. The project will not impact land under agricultural production.

II. Population and Housing

- a) The project area lies within an agricultural zone and will not cause population impacts.
- b) The project will reconfigure the river to better conform with the current flow regime and will not induce growth.

III. Geologic Problems

- a) The project is not located in an active fault zone.
- b) The project will not induce impacts in terms of unstable soil conditions from excavation, grading or fill. Because areas where soil is disturbed will be compacted and re-vegetated, the project will not cause erosion impacts. Channel reconfiguration will cause a change in topography. However, because the existing topography was created by berm failure and gravel extraction, resulting in a highly disturbed, braided river segment, topographical changes caused by are not considered significant impacts.

Scour channels will be configured to create seasonal wetland habitat that will be managed by the California Department of Water Resources, the California Department of Fish and Game, the landowner, or a combination thereof. The scour channels will have a depth of approximately 2 feet, and the main river channel will have an average depth of 5 feet. Since Project related topographic changes would create functional stream reach, impacts are not considered significant.

IV. Water

- a) The project will not cause changes in absorption rates, or the rate and amount of surface runoff. However, the creation of seasonal wetland habitat may alter the drainage patterns. Under project conditions, water that ponds in the wetlands could remain on the floodplain for a longer period than under existing conditions. However, because the wetlands provide seasonal rather than permanent habitat, and because the maximum average basin depth will be two feet below grade, any changes in drainage patterns are considered to be less than significant.
- c) Measures will be implemented to avoid discharge into the Merced River. Because the construction activities can potentially result in localized, short-term impacts to water quality due to fuel or oil leaks or spills, the best management practices (BMPs) will be implemented to contain construction activity pollutants such as wastes, erosion, and sediment. Post-Project benefits to water quality include a decrease in fine sediment transport and a decrease in water temperatures. Because BMPs will be implemented under contract with DWR, any impacts resulting from the discharge of pollutants or sediment into surface waters are considered less to be than significant.
- d) Changes in the amount of surface water will occur in the Robinson Reach, since the lack of a defined channel has resulted in wide areas covered by only a few inches of water. These conditions have persisted since the 1997 flood event resulted in several levee breaches, gravel pit capture, and subsequent channel braiding. The Project will create a defined channel, a wider floodplain, and the scour channels and borrow pits will result in more seasonal wetland acreage than was present pre-1997. Since these changes will result in improved river and floodplain dynamics, any impacts resulting from a change in the amount of surface water are considered to be less than significant.
- e) At this time, the created seasonal wetland habitat will remain independent of the reconfigured river channel, except during times of flood when water is distributed across the floodplain. Because the wetlands would provide seasonal rather than permanent habitat, and because the maximum average basin depth will be only two feet below grade, any changes in currents or the course or direction of water are considered to be less than significant.

V. Air Quality

- a) Construction activities may potentially result in localized, short-term construction emissions from stationary, mobile, and area sources. Emissions may include hydrocarbons, nitrogen oxides, sulfur oxides, carbon monoxide, and particulate matter. Fugitive dust may be emitted during use of earthworking equipment. Specific equipment to be used during construction are discussed in detail in the attached Initial Study. Best available air quality control technologies will be implemented, and fugitive dust will be minimized during construction. Because the best available air quality control technologies will be implemented in adherence to contract specifications any air quality impacts are considered to be less than significant.

VI. Transportation/Circulation

- a) The overall project area is located in an agricultural zone. Merced, the closest city, is located approximately 15 miles south of the project area. The project is not located near any residential areas.

Construction equipment will be transported to the job site and, when not in use, will be stored in a staging area.

Material will be hauled on county roads and on on-site haul roads, but loaded trucks and hauling equipment will not exceed HS20-44 live loading. Additionally, the contractor will not restrict use of any county roads traversing the project area. Existing access will be maintained and restored by the Contractor.

The Contractor will prepare a traffic abatement plan that addresses traffic in the project area, and traffic to and from the area. The plan will incorporate county and State safety requirements, and will incorporate measures for preventing unauthorized public access to the work site.

By implementing the above measures, any transportation/circulation impacts will be less than significant.

VII. Biological Resources

- c) Field surveys and record searches conducted by DWR biologists revealed that project impacts potentially could occur to endangered, threatened or rare species or their habitats unless mitigation measures are implemented. An incidental take permit will be obtained for take of Valley Longhorn Elderberry

Beetle (*Desmocerus californicus dimorphus*) critical habitat. Although no VELB or VELB exit holes were observed during the elderberry surveys, 135 elderberry shrubs were found within the Robinson reach of the project area. Project related impacts within the Robinson reach would result in disturbance to 87 of these shrubs. Of these 87 shrubs, 47 have at least one stem 1 inch in diameter. In accordance with the July 1999 USFWS conservation guidelines for the Valley elderberry longhorn beetle, these 47 shrubs will be transplanted.

Pre-construction surveys will be conducted for Swainson's hawk (*Buteo swainsoni*), in accordance with DFG survey protocols. Potential foraging, nesting, and roosting habitat is present within the construction boundaries, but most riparian tree species to be removed during construction are young, small, and not likely to be utilized as nesting trees. However, there are mature riparian tree species adjacent to the project area that could be utilized as nesting trees. This species has been sighted within the project area, but no nest locations have been documented within the project area boundaries. If a nest is located within or adjacent to the project area, the avoidance and mitigation requirements outlined by CDFG will be adhered to.

Pre-construction trapping surveys will be conducted for riparian brush rabbit (*Sylvilagus bachmani riparius*). Potential habitat for this species is available along the Merced River riparian corridor, especially in areas with a dense blackberry understory (Laurissa Hamilton, personal communication). This habitat type is scattered throughout the project area. Surveys for this species were conducted by DWR staff in July 2000, and no riparian brush rabbits were located. Pre-construction trapping surveys will also be conducted for riparian woodrat (*Neotoma fuscipes riparia*). Surveys for woodrat houses were conducted by DWR staff in Spring 2000, and these survey efforts yielded no evidence of woodrats. These species are not likely to be present in the project area due to the lack of mature riparian vegetation within the project area. However, if either of these species are encountered, mitigation measures currently being developed with the USFWS will be implemented.

Post-project floodplain dynamics and re-vegetation efforts will improve habitat conditions for all three of these species, which are dependent on mature riparian habitat. For a comprehensive discussion of potentially impacted species within the project area, please refer to the attached initial study. By implementing avoidance and mitigation measures for potentially impacted special status species, impacts will be reduced to less than significant levels.

- b) Locally designated species will not be impacted
- c) Locally designated natural communities will not be impacted.
- d) Historically, before conversion to agriculture, the region surrounding the

Project Area was a complex of riparian forest, vernal pools, floodplain, and annual grassland communities. Removal of riparian vegetation to facilitate agricultural practices has resulted in only a narrow strip of riparian vegetation occurring along the incised river channel. The riparian habitat and floodplain have been further disturbed by intensive aggregate mining. No vernal pools are present within the Project Area.

Overall, implementation of the proposed project would result in a net gain of 10.07 acres of riparian habitat within the floodplain (7.56 of herbaceous wetlands and 2.51 of scrub-shrub and forested riparian habitat). However, within the riverine classification there would be a net loss of 13.83 acres of scrub-shrub and forested wetland. This is due to a reduction in amount of area inundated at ordinary high water (1,700 cfs). This occurs because the project would eliminate areas that are characterized by sheet flow and lack a defined river channel. Also, open water habitat would be eliminated as abandoned gravel extraction pits are filled. A more detailed discussion is in the attached initial study.

After the project is complete, a mixture of approximately 49.07 acres of herbaceous and woody wetland types are expected to occur within the riverine classification. Areas of wetland adjacent to the river channel (16 acres) and within the simulated abandoned channels, backwater, and wetland area portions of the project would comprise these acres (33.07 acres). Compared to undisturbed sites along the Merced River, the existing vegetative condition of the project site is very different and is likely far outside of the natural range of variability for this section of the Merced River corridor. Due to the restoration of geomorphic function along the project reach, the riparian habitat that will be planted and that will develop naturally within the floodplain is expected to more closely mimic undisturbed riparian habitats that exists at upstream reference sites. Since Project-related changes to wetlands will result in a conversion of wetland types, but not in a net loss to wetlands, wetland impacts are considered to be less than significant.

- e) Short-term Project related impacts to wildlife dispersal or migration along the riparian corridor could potentially occur unless mitigation measures are implemented. For a discussion of potential impacts and proposed mitigation measures, please refer to the attached initial study. Since impacts will be short-term, mitigation and avoidance measures will be implemented, and the riparian corridor will widen and improve in habitat value post-Project, impacts to wildlife dispersal or migration are considered to be less than significant.

VIII. Energy and Mineral Resources

No project impacts to energy or mineral resources are expected.

IX. Hazards

- a) Storage, transportation, transfer, containment, and disposal of hazardous materials, such as fuel, oil, and lubricants could potentially pose a hazard. To minimize such an occurrence, the use of hazardous materials will be avoided or minimized. Hazardous materials will be stored at designated sites, and each hazardous material container will be clearly labeled with its identity, handling and safety instructions, and emergency contact. Similar information shall be clearly available and visible in the storage areas. Material Safety Data Sheets (MSDS) will be available to the Contractor's employees and other personnel at the work site. Accumulation and temporary storage of hazardous wastes shall not exceed 90 days. Soils contaminated by spills or cleaning wastes will be contained and removed to an approved disposal site. Disposal of hazardous wastes will be in compliance with all applicable laws and regulations.

Construction equipment will be maintained to minimize petroleum drippings, and stationary power equipment such as engines, pumps, generators, welders, and air compressors shall be positioned over drip pans. Equipment used in water will be free of exterior petroleum products prior to submersion, and will be checked and maintained daily to keep the exteriors clean. Petroleum products will be stored in leak-proof containers at impervious storage sites not susceptible to runoff.

Personnel stationed at or near these sites will be trained in emergency response and spill containment techniques. Spill containment materials will be available at the storage sites for use in the event of spills. Contaminated materials will be placed in leak-proof containers for transport to an appropriate facility.

Fuel may be transferred from the storage areas to construction equipment by tanker trucks. Fuel transfers will take place at least 100 feet from exclusion zones, drainage areas, and streams. Transfer vehicles will have spill containment materials placed between the fuel truck and the equipment being serviced. A service attendant, trained in emergency response, fire extinguisher use, and spill containment techniques, will monitor the filling of equipment.

Implementation of these precautions, will reduce the risk of accidental explosion or release of hazardous substances to less than significant levels.

X. Noise

- a) The overall project area is located in an agricultural zone. Merced, the closest city, is located approximately 15 miles south of the project area. The project is not located near any residential areas.

To reduce potential noise impacts to less than significant levels, construction vehicles and other equipment, both stationary and mobile, will be equipped with properly operating and maintained mufflers. Selected haul routes will minimize noise impacts to sensitive receptors. Local planning jurisdictions will be consulted in the selection of haul routes.

XI. Public Services

a-d) Impacts to public services are not anticipated.

XII. Utilities and Service Systems

a-g) Impacts to utilities and service systems are not anticipated.

XIII. Aesthetics/Scenic Resources

b) Short-term negative aesthetic effects may occur as a result of project construction. However, since the riparian corridor will improve over existing conditions post-project through re-vegetation efforts and natural vegetation recruitment, impacts to the aesthetic value of the Project Area are considered to be less than significant.

XIV. Cultural Resources

a). A cultural resources record search was conducted on May 5, 1999. No previous cultural resources or cultural resource surveys have been documented for the project area. A general reconnaissance field survey was conducted in August, 2000 by DWR Associate State Archaeologists. One cultural resource was located within the project area; pier remains from the Yosemite Valley Railroad. The remains include 6 cylindrical concrete piers twenty-five feet in height, and sixteen wooden posts ranging from six inches to 10 feet in height. The cylindrical concrete piers have wooden log centers, and were encased in sections of riveted sheet iron. The piers have severely deteriorated: two of the piers have fallen into the stream bed, and approximately 95% of the outer iron sheeting was previously removed. In addition, sections of the concrete are breaking off and eroding. The resource was recorded on the appropriate Department of Parks and Recreation forms and submitted to the CHRIS Central California Information Center for processing. Due to lack of integrity, the Yosemite Valley Railroad pier remains located in the project area are considered ineligible for listing in the National Register of Historic Places

(NRHP). As a result of these findings, project related impacts to cultural resources are considered to be less than significant.

XV. Recreation

- a) The project will not increase the demand for neighborhood or regional parks or other recreational facilities.
- b) All of the land within the project area is privately owned. However, short-term impacts may occur to recreational uses of the river such as canoeing and kayaking. Since the purpose of this project is to improve river and floodplain dynamics by reconfiguring the channel to better conform with the present flow regime, recreational opportunities of this type will be improved post-project. As a result, impacts to existing recreational opportunities are considered to be less than significant.

XVI. Mandatory Findings of Significance

- a) The potential environmental impacts concerning these issues could be significant unless mitigated. For a comprehensive discussion of potentially impacted species and habitats within the project area, as well as proposed mitigation measures, please refer to the attached initial study. By implementing avoidance and mitigation measures for potentially impacted species and habitats, impacts will be reduced to less than significant levels.
- b) This project does not have the potential to achieve short-term, to the disadvantage of long-term, environmental goals.
- c) The proposed project will not induce impacts that are individually limited, but cumulatively considerable.
- d) The proposed project will not induce environmental effects that will cause substantial adverse effects on human beings.

Appendix B
List of Federal or State Listed Threatened Endangered Species

Endangered and Threatened Species That May Occur in or be Affected by
 Projects in the U.S.G.S. 7 Minute Quads Listed at the End of This Report
 Merced River Salmon Habitat Enhancement Project
 November 15, 2000

Listed Species

Mammals

San Joaquin kit fox	<i>Vulpes macrotis mutica</i>	(E)
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Birds

Aleutian Canada goose	<i>Branta canadensis leucopareia</i>	(T)
bald eagle	<i>Haliaeetus leucocephalus</i>	(T)

Reptiles

blunt-nosed leopard lizard	<i>Gambelia (=Crotaphytus) sila</i>	(E)
giant garter snake	<i>Thamnophis gigas</i>	(T)

Amphibians

California red-legged frog	<i>Rana aurora draytonii</i>	(T)
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Fish

delta smelt,	<i>Hypomesus transpacificus</i>	(T)
Central Valley steelhead	<i>Oncorhynchus mykiss</i>	(T)
Central Valley spring-run chinook salmon	<i>Oncorhynchus tshawytscha</i>	(T)
Winter-run chinook salmon	<i>Oncorhynchus tshawytscha</i>	(E)
Sacramento splittail	<i>Pogonichthys macrolepidotus</i>	(T)

Invertebrates

Conservancy fairy shrimp	<i>Branchinecta conservatio</i>	(E)
vernal pool fairy shrimp	<i>Branchinecta lynchi</i>	(T)
valley elderberry longhorn beetle	<i>Desmocerus californicus dimorphus</i>	(T)
vernal pool tadpole shrimp	<i>Lepidurus packardii</i>	(E)

Plants

fleshy owl's-clover	<i>Castilleja campestris ssp. succulenta</i>	(T)
San Joaquin Valley Orcutt grass	<i>Orcuttia inaequalis</i>	(T)
hairy Orcutt grass	<i>Orcuttia pilosa</i>	(E)
(May be extirpated from all or part of this area.)		

Proposed Species

Birds

mountain plover	<i>Charadrius montanus</i>	(PT)
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Candidate Species

Amphibians

California tiger salamander	<i>Ambystoma californiense</i>	(C)
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Fish

Central Valley fall/-run chinook salmon	<i>Oncorhynchus tshawytscha</i>	(C)
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Species of Concern

Mammals

Pacific western big-eared bat	<i>Corynorhinus townsendii townsendii</i>	(SC)
Merced kangaroo rat	<i>Dipodomys heermanni dixonii</i>	(SC)
greater western mastiff-bat	<i>Eumops perotis californicus</i>	(SC)
small-footed myotis bat	<i>Myotis ciliolabrum</i>	(SC)
long-eared myotis bat	<i>Myotis evotis</i>	(SC)
fringed myotis bat	<i>Myotis thysanodes</i>	(SC)
long-legged myotis bat	<i>Myotis volans</i>	(SC)
Yuma myotis bat	<i>Myotis yumanensis</i>	(SC)
San Joaquin pocket mouse	<i>Perognathus inornatus</i>	(SC)

Birds

tricolored blackbird	<i>Agelaius tricolor</i>	(SC)
Bell's sage sparrow	<i>Amphispiza belli belli</i>	(SC)
western burrowing owl	<i>Athene cunicularia hypugea</i>	(SC)
ferruginous hawk	<i>Buteo regalis</i>	(SC)
little willow flycatcher	<i>Empidonax traillii brewsteri</i>	(CA)
white-faced ibis	<i>Plegadis chihi</i>	(SC)

Reptiles

silvery legless lizard	<i>Anniella pulchra pulchra</i>	(SC)
northwestern pond turtle	<i>Clemmys marmorata marmorata</i>	(SC)
southwestern pond turtle	<i>Clemmys marmorata pallida</i>	(SC)
California horned lizard	<i>Phrynosoma coronatum frontale</i>	(SC)

Amphibians

western spadefoot toad	<i>Scaphiopus hammondi</i>	(SC)
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Fish

green sturgeon	<i>Acipenser medirostris</i>	(SC)
river lamprey	<i>Lampetra ayresi</i>	(SC)
Kern brook lamprey	<i>Lampetra hubbsi</i>	(SC)
Pacific lamprey	<i>Lampetra tridentata</i>	(SC)
longfin smelt	<i>Spirinchus thaleichthys</i>	(SC)

Invertebrates

California linderiella fairy shrimp	<i>Linderiella occidentalis</i>	(SC)
molestan blister beetle	<i>Lytta molesta</i>	(SC)

U.S.G.S. 7 ½ minute quads	Quad#
YOSEMITE LAKE	421B
WINTON	422A

KEY:

(E) Endangered	Listed (in the Federal Register) as being in danger of extinction.
(T) Threatened	Listed as likely to become endangered within the foreseeable future
(P) Proposed	Officially proposed (in the Federal Register) for listing as endangered or threatened.
(PX) Proposed Critical Habitat.	Proposed as an area essential to the conservation of the species.
(C) Candidate	Candidate to become a proposed species.
(SC) Species of Concern	May be endangered or threatened. Not enough biological information has been gathered to support listing at this time
(MB) Migratory Bird	Migratory bird
(D) Delisted	Delisted. Status to be monitored for 5 years.
CA) State-Listed	Listed as threatened or endangered by the State of California.
Critical Habitat	Area essential to the conservation of a species.

Appendix C
Revegetation Plan

Robinson Reach Revegetation Plan

As a result of channel modifications, 190 acres of floodplain, the 33-acre main channel and 33 acres of simulated abandoned channels, backwater and the below-grade wetland area within the northern flank of the floodplain will be devoid of vegetation when earth moving activities cease. Ecological functioning within the riparian corridor is tightly linked to the vegetation both within and beyond the floodplain. Nutrient input contributed by plants and the creatures that feed on them supports the aquatic network upon which the invertebrates, fish and other vertebrates of the riparian corridor depend. Shade and coarse woody debris also promote diversification of habitats within the riparian zone, modify temperatures within the water column, and provide refuge from predators. In order to meet the objectives of enhancing salmonid reproduction, survival and migration, revegetation with appropriate native species is an essential component of riparian restoration in the Robinson Reach.

Revegetation Goals

The objectives of the revegetation plan are:

- Establish self-sustaining native riparian plant species.
- Maintain biodiversity and enhance riparian habitat values.
- Prevent the spread of invasive exotic plant species to the new floodplain area.

Specific actions required to meet these goals will consist of:

- Planting 99 acres of floodplain and portions of constructed simulated abandoned channels with woody and herbaceous vegetation. These are to be native species currently found in or immediately adjacent to the Robinson Reach (See Table C-1). Container plants grown from locally-collected, (insofar as possible) seeds and/or cuttings, willow and cottonwood cuttings planted directly and direct seeding of some herbaceous species will be used.
- Some 35 acres of seasonally- and permanently-inundated wetland areas (jurisdictional wetlands) will be allowed to regenerate naturally, with appropriate control of invasive exotics such as parrot's-feather (*Myriophyllum aquaticum*) or water-hyacinth (*Eichhornia crassipes*) as needed.
- Experimental areas of the floodplain and point bars (roughly 90 acres) will be allowed to regenerate naturally. Establishment of native stands of riparian vegetation in these areas may be enhanced by placement of topsoil in designated areas during construction, bundling of coarse woody debris in rows to trap fine sediments, or other methods.

- Monitoring of vegetation by belt transects and herbaceous plots on a yearly basis will yield data on cover, density and diversity of native and exotic species. (see Monitoring section below).

Site Description

The Robinson Reach is now a braided channel with sheet flow in some sections. The geologic setting for this reach is as follows:

The Miocene-Pliocene Merhten formation underlies the area and forms outcroppings along the southern cliffs (Marchand, 1976). This is composed of andesitic, angular, river-born sands, likely reworked from volcanic mudflows to the northeast. It is one of the most important aquifers in the region (Page and Balding, 1973). The Turlock Lake formation of early Pleistocene age forms larger outcroppings just to the south. This is composed of alluvial granitic sands and gravels overlying fine silt and clay. The river channel and floodplain are in, or immediately adjacent to, Tujunga, Hanford and Grangeville gravels, sands and loams. Gravel and cobble lenses are the prominent features visible when one visits this reach. The fines so necessary for lush riparian growth are here, but not abundantly. Judicious placement of smaller grain sizes during channel reconstruction will benefit the revegetation effort tremendously.

High flows in 1997 caused the main channel to be abandoned, resulting in 5-7' entrenchment of the channel at the upper end of the reach. This has lowered the water table so that significant numbers of century-old valley oaks (*Quercus lobata*) along the southern flank of the floodplain are dead or senescent. Aggregate extraction has created pools in the middle portions of the reach. Existing woody vegetation can be described as mature mixed riparian, riparian oak forest, mixed willow, willow scrub, and riparian scrub. Herbaceous communities include riverwash, non-native (weedy) grassland dominated by rice cutgrass (*Leersia oryzoides*) and large crabgrass (*Digitaria sanguinalis*) and seasonal and emergent wetlands.

The proportion of woody vegetation is presently between 15-20%; most of the site is sparsely vegetated riverwash and grassland communities. From aerial photographs in the 1940's, it appears that this proportion is more-or-less representative of the historical situation. A remnant of riparian oak forest is found on the upstream end of the reach, and riparian oak forest is abundant on the Robinson property just upstream of the project area. Fremont cottonwoods (*Populus fremontii*) are present, if not abundant, along portions of the northern floodplain, in small patches of cottonwood riparian forest. Mixed-willow forest in this reach consists of Goodding's willow (*Salix gooddingii*), arroyo willow (*S. lasiolepis*), red willow (*S. laevigata*) and buttonwillow (*Cephalanthus occidentalis*), and forms the majority of the woody vegetation in this reach. Willow scrub is composed principally of sandbar willow (*S. hindsiana*) and young Goodding's willow. Willow scrub occupies most of the gravel bars subject to sheet flow since the 1997 high water event. Mixed riparian forest includes various willow species, with white alder (*Alnus rhombifolia*) and Oregon ash (*Fraxinus latifolia*) as prominent components, and

California grape (*Vitis californica*) and Himalayan and California blackberries (*Rubus discolor* and *R. ursinus*) in the understory.

Reference Site

Just upstream of the project boundary, still on the Robinson property, is a twenty-acre site which is probably the best reference site for revegetation on this reach. This site has high diversity and complex structure. Valley oaks, alders, ash and other riparian dominants are found on thick loam. Whiteroot (*Carex barbarae*) and the perennial creeping wildrye (*Leymus triticoides*) form thick stands in the understory, while California grape and California blackberry vines contribute structural diversity. The yellow-flowered *Bidens laevis* forms intensely showy patches in the wetlands during the late summer when most other species are not in flower, enhancing temporal diversity for pollinators. Species not common on the valley floor also occur, including spicebush (*Calycanthus occidentalis*), gray pine (*Pinus sabiniana*), buckeye (*Aeschylus occidentalis*) and yerba santa (*Eriodictyon californica*), among others.

Surprisingly, Western sycamores (*Platanus racemosa*), common components of riparian systems throughout central California, are apparently not known from the upper Merced River drainage. (Todd Keeler-Wolfe, pers. comm.; Dan Holland, unpublished data) nor the lower (John Stella, Stillwater Science, pers. comm.). DWR staff visited sites throughout the upper drainage following rumors to the contrary, but no sycamores were found, although London plane tree (*Platanus occidentalis*) is abundant from the Robinson reach through Snelling and up to the New Exchequer Dam.

Hydrology

Riparian species are adapted to germinate and survive under particular flow regimes. Sandbar willow, alder, and buttonbush are generally found in close proximity to the main channel where inundation is most frequent, while Fremont cottonwood and valley oaks are generally higher on the floodplain or adjacent terraces. (USBR/DWR, unpub. Data, 2000; Stillwater Sciences, 2000). A map of probable inundation area for given Q values along this reach will be used to place the species at appropriately floodplain elevations to give plantings the best chance of long-term survival once irrigation is removed. Along the Merced near Snelling, just upstream of the Robinson Reach, cottonwood forest are more commonly found at inundation flows between Q_5 and Q_{10} , mixed riparian at $Q_{1.5}$, and riparian oak forest between $Q_{2.5}$ to Q_{25} (Stillwater Sciences, 2000).

Planting Plan and Methods

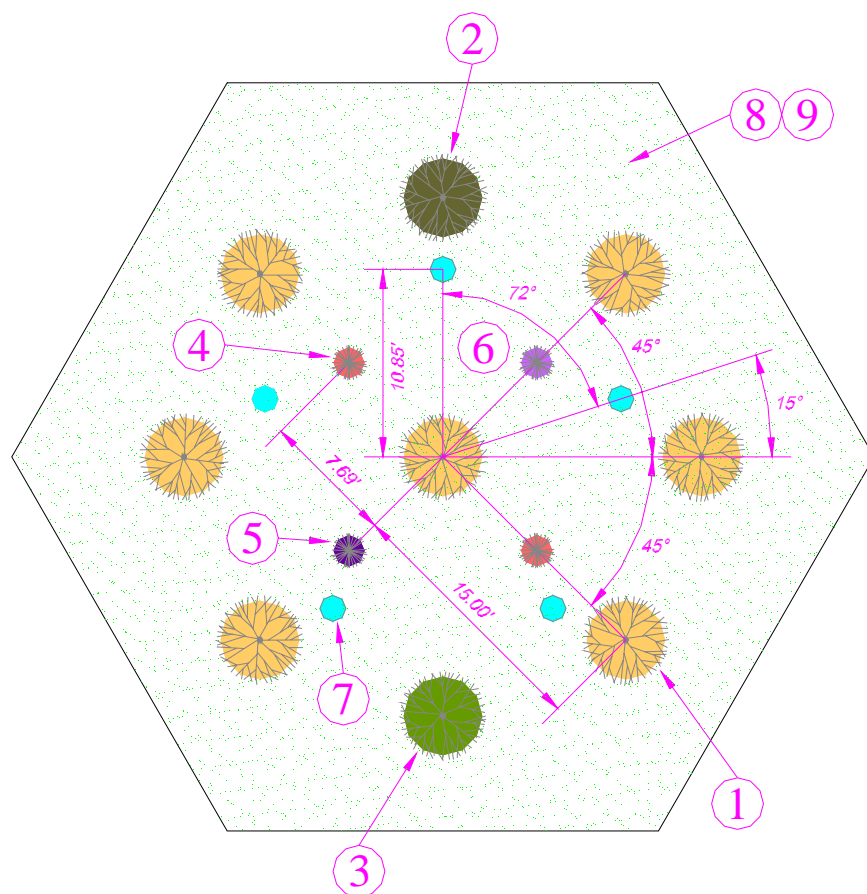
The planting scheme will utilize hexagonal (50' in the longest dimension) modules (see Figure C-1) of various compositions of native species of trees, vines and grasses, sedges and rushes to create a mosaic of riparian habitats (See module map, Figures C-2 and C-3, and species list, Table C-1). These are intended to become self-sustaining formations which will approximate the mixed riparian, mixed willow, cottonwood riparian, willow scrub, and herbaceous communities described above.

Scientific Name	Common Name	Plant code	Total Plants Needed
Acer negundo	Boxelder	ACENEG	2,923
Alnus rhombifolia	White alder	ALNRHO	4,662
Artemisia douglasiana	Mugwort	ARTDOU	7,059
Carex barbarae	White root	CARBAR	120,092
Cephalanthus occidentalis	Buttonbush	CEPOCC	2,600
Fraxinus latifolia	Oregon ash	FRALAT	2,487
Juncus effusus	Common bog rush	JUNEFF	13,195
Juncus mexicanus	Mexican rush	JUNMEX	7,581
Leymus triticoides	Creeping wild-rye	LEYTRI	57,918
Lupinus albifrons	Silver bush lupine	LUPALB	680
Nassella cernua	Nodding needlegrass	NASCER	9,630
Populus fremontii	Fremont cottonwood	POPFRE	3,252
Quercus lobata	Valley oak	QUELOB	952
Rosa californica	California rose	ROSCAL	3,762
Rubus ursinus	California blackberry	RUBURS	2,073
Salix gooddingii	Gooding's willow	SALGOO	2,675
Salix laevigata	Red willow	SALLAE	438
Salix lasiolepis	Arroyo willow	SALLAS	2,844
Sambucus mexicana	Blue elderberry	SAMMEX	150
Vitis californica	Wild grape	VITCAL	1,497
	Total		246,470

Table C-1 – Robinson Project Revegetation Plant List

Ninety-nine acres will be covered by planting modules. Ninety-six acres of floodplain are to be covered by these, and 6 acres or approximately one-half, of the Simulated Abandoned Channels. The modules are designed to achieve various levels of cover of woody vegetation over the span of five years time, given proper irrigation, appropriate depth to water table, a minimum of prolonged periods of inundation while the plants are establishing, etc. The goal of establishing 15-20 percent cover of woody vegetation within 5 years should be well exceeded by these module plantings as well as natural recruitment in the portions of floodplain, Simulated Abandoned Channels, and the backwater area which are to be left to regenerate on their own.

Modules emphasize certain species, i.e. Fremont cottonwood, white alder, Oregon ash, valley oak, etc. (See Fig C-1). The number of modules and their species distribution are shown in Tables C-2a and C-2b. In most cases, strips and blocks of modules will be at minimum 3 modules in width, with gaps of 1-2 module widths between. The gaps between modules may be larger than this (Figures C-2, C-3). Some strips of modules will be arranged perpendicular to river flows in order to trap sediments and provide good substrate for natural recruitment. The final placement of modules will depend upon the hydrology, e.g. the modules containing sedges will be nearer the low flow channel than those containing needlegrass, and cottonwoods will be generally upslope of alders, etc. In part this placement is in accordance with observed relations in the area of the Robinson Reach (Stillwater Sciences, 2000), and in part it will be randomized within hydrologically-determined boundaries, in order to emulate natural stochasticity.



Key	Plant Name	Species	No. Per Module
①	Cottonwood	Populus Fremonti	7
②	Ash	Fraxinus Latifolia	1
③	Boxelder	Acer Negundo	1
④	Wild Rose	Rosa Californica	2
⑤	Blackberry	Rubus Ursinus	1
⑥	Wild Grape	Vitis Californica	1
⑦	Mugwort	Artemisia Douglasii	5
⑧	Sedge	Carex Barbarae	36
⑨	Creeping Wildrye	Leymus Triticoides	36

Figure C-1 – Module Example (MCTN)

Note: Modified from HDR Engineering, Inc 1999, Tuolumne River Channel Restoration Project

	ABOX	BBSH	MWIL2	SEDG	WSYC	BWIL	MVOKa	MVOKb	WSYC2	ABOX2
Total Mods	247	200	189	40	0	128	68	68	0	189
Species										
ACENEG	5		1		1		1	1	1	5
ALNRHO			4		5					
ARTDOU										
CARBAR	38	77	36	115	36	77		36		
CEPOCC		13								
FRALAT	4		1		1		1	1	1	4
JUNEFF			29							
JUNMEX										
LEYTRI	38		36		36		36	36	36	38
LUPALB							5	5	5	
NASCER							36		36	38
PLARAC					0				0	
POPFRE							1			
QUELOB							7	7		
ROSCAL	2		2		2	1	2	2	2	2
RUBURS	1		1		1	2	1	1	1	1
SALGOO			3			9				
SALLAS										
SALLEA			3							
SAMMEX										
VITCAL	1				1	1	1	1	1	1

Table C-2a – Total Modules and Number of Plants Per Module

	MCTN	COTN	MWIL	RWIL	MG	JUN	LEYT	EBS	ALD	Total
Total Mods	199	199	219	180	200	133	131	30	259	2679
Species										
ACENEG	1		1							17
ALNRHO									18	18
ARTDOU	5	4	4		13				4	39
CARBAR	36	36	36	77			115		79	794
CEPOCC										13
FRALAT	1		1							15
JUNEFF						58				87
JUNMEX						57				57
LEYTRI	36	36	36				38	82		484
LUPALB										15
NASCER										110
PLARAC										0
POPFRE	7	9								17
QUELOB										14
ROSCAL	2	2	2	2					2	25
RUBURS	1	1	1	1					1	14
SALGOO			2						2	16
SALLAS			2							2
SALLEA			3	9						15
SAMMEX								5		5
VITCAL	1	1	1	1						11

Table C-2b – Total Modules and Number of Plants Per Module

Installation of plants

All planting will be done in the months of November through January.

Cuttings

Willow and cottonwood cuttings will be collected locally immediately prior to installation. Cuttings will be a minimum of 1" in diameter and 3' long. Cuttings will not be allowed to dry out before installation.

Cuttings will be installed in holes augered in the substrate to a depth of 2.5', leaving a 6" stub with at least two bud nodes sticking out of the ground. Cuttings will be protected by a 3' tall tree tube staked at each site. Watering basins 2' in diameter and 3" deep will be constructed around each cutting. Cuttings will be watered in immediately following planting by filling the watering basin two times.

Container Plants

Shrubs and trees will be planted in holes dug approximately 12" deep, then partially backfilled to form a mound in the center. Plants will be removed from the containers and the roots loosened, then spread out over the mound. Planting holes will be backfilled with a 50:50 mix of commercial planting mix and local substrate. Watering basins (see above) will be constructed around each planting, and the plants will be watered in after planting.

Oaks

Holes will be augered to a depth of 3' and backfilled with a 50:50 mix of commercial planting mix and local substrate. Watering basins will be constructed as above around each site. Three acorns will be set on their sides in the backfilled hole, and covered with planting mix about 1" deep to conserve moisture.

Acorns will be protected by a 3' tall tree tube staked at each site. Each site will be thoroughly watered after planting.

Plugs

Grass and sedge plugs will be planted in holes augered to the size of the container. The plugs will be removed from the container and the roots loosened around the outer surface of the root ball. The plug will then be placed in the hole and the substrate firmed around it. Each plug will be watered in after planting.

Direct Seeding of Herbaceous Plants

Direct seeding of herbaceous species may be a lower-cost alternative to nursery plugs. The acreages and species list are to be determined. Hydroseeding is one possible method of application.

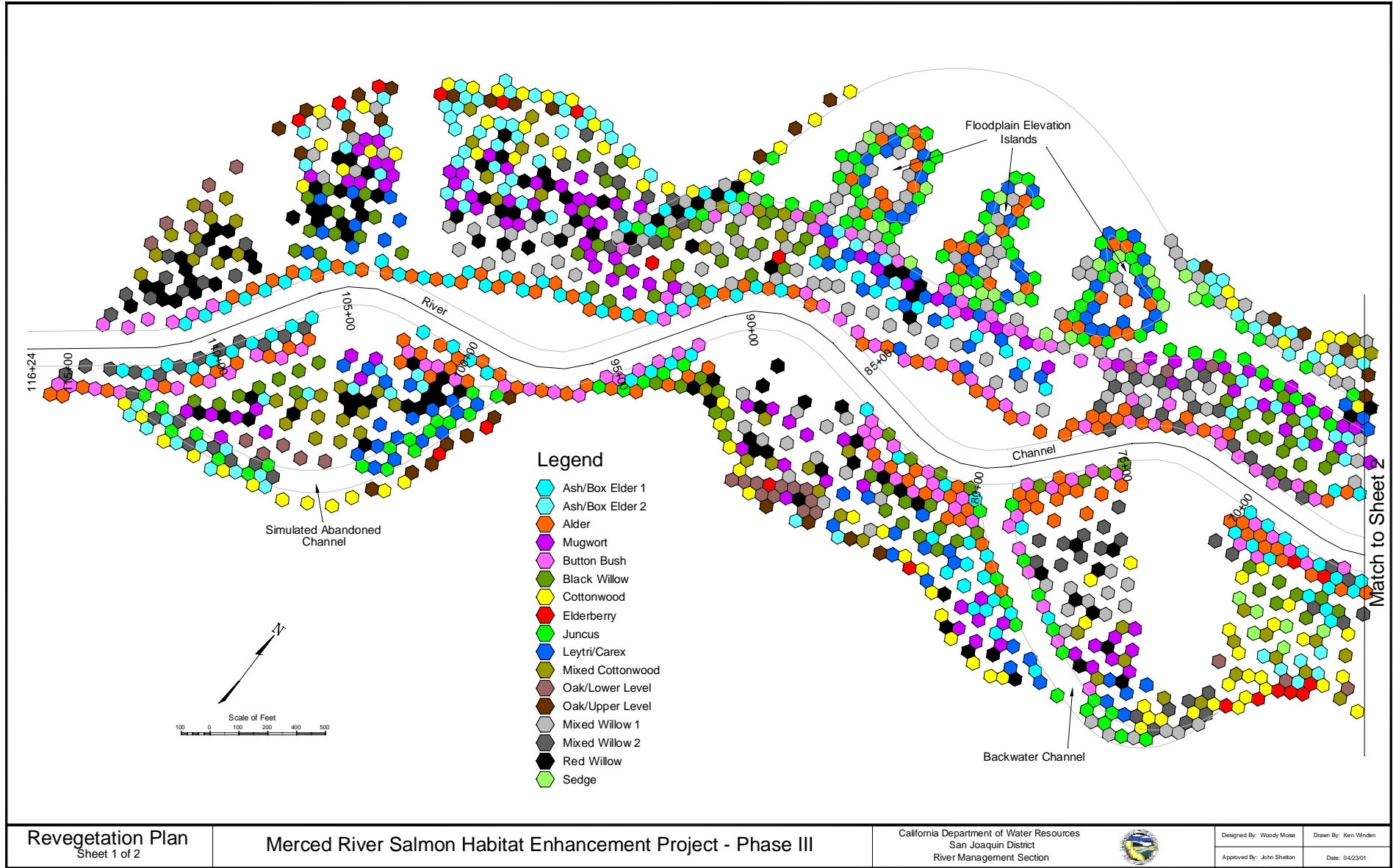


Figure C-2 – Revegetation Plan Layout Downstream

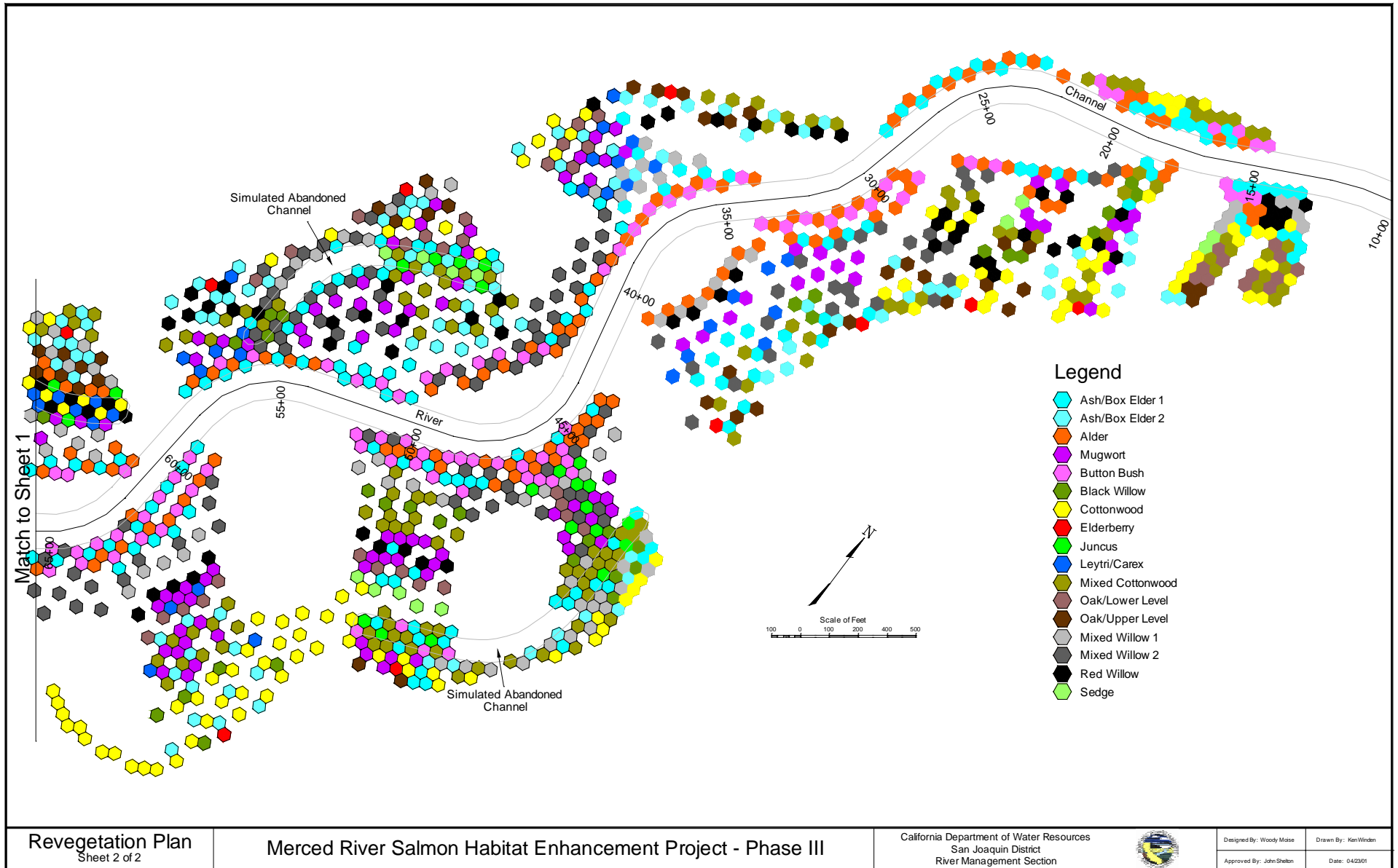


Figure C-3 – Revegetation Plan Layout Upstream

Additional Measures to Enhance Vegetation

The existing substrate is relatively poor in fine particles. Some sorting of sediments will be possible during construction. These will be placed in module areas and in areas designated as natural regeneration zones. In addition, improvement of soil conditions within the reach to enhance establishment of natives may be accomplished by the installation of woody debris windrows perpendicular to the flow of the river. This would be recommended in the upper floodplain. During major high water events, silts would settle out around the debris and promote establishment of plants. The woody debris would also provide some animal habitat values and protection for seedlings. The debris would be in relatively small chunks to avoid being caught around the bridge pilings. The debris must be well-anchored with boulders or cables. Wood debris left after construction may be stockpiled to this end.

Irrigation

Plants will be watered weekly or as needed during the dry season or during any period of two weeks without at least 1" of rainfall. Water will be sufficient to wet the entire root system of the plant or equivalent to a 1" rain. Watering methods to be determined by consultation with the property owner.

Weed Control

Weeds will be monitored on a monthly basis during the growing season (approximately March through September), and weed control will be such that weeds do not threaten the survival or growth of the plantings. Noxious weeds such as tree of heaven, giant reed, salt cedar and eucalyptus will be targeted for complete eradication. Star thistle will be controlled, with a goal of eventual eradication. Methods may include hand removal, mowing, and selective use of approved herbicides.

Plant Replacement

Acceptable mortality for container stock plantings, during the first three years of monitoring, is 30 percent. Annual assessment of container stock viability will be noted and replacement plantings will be installed where mortality is greater than the acceptable limit. Replacement of container stock will occur only during the first three years of the monitoring phase.

Predator Protection

A variety of methods may be used to control beaver and other rodent predation on plants which are establishing. Tree planting tubes and depredation permits are two possibilities which may be used, as appropriate.

Monitoring

The goal of the revegetation program is to create 30% cover of riparian vegetation over the floodplain areas, in addition to the approximately 35 acres of seasonal and permanent emergent wetland vegetation that is expected to develop within the SACs and along the margins of the low-flow channel. Monitoring will be conducted on a yearly basis to ensure that the goals of the program are met within the 5-year time frame. Monitoring methods will include survival counts, transect data for cover and species composition, and aerial photos taken at 3 years, 4 years, and 5 years in order to prepare cover type maps using GIS. If monitoring shows that the goals of revegetation are not being met, appropriate action will be taken by the project managers to ensure that revegetation is successful.

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Appendix D
FISHERY MONITORING PLAN
Merced River Salmon Habitat Enhancement Project
Robinson Reach

INTRODUCTION

The Robinson Site is a 2 mile river restoration project located immediately upstream of the State Highway 59 Bridge on the Merced River, 6 miles southwest of the town of Snelling. The project will improve river and floodplain dynamics, increase and improve salmonid spawning and nursery habitat, reduce mortality of juvenile salmon due to predation, and enhance the riparian corridor. This project is the second of several contiguous projects in the area that have been collectively called the Merced River Salmon Habitat Enhancement Project. When combined, the habitat project will improve over 4.5 miles of important aquatic and riparian habitats on the lower Merced River. The goal for the Robinson Reach is to reform the river into a more natural, functional reach with well defined channels and floodplain, which would be beneficial to the salmon of the Merced River. Specific biological/ecological objectives of the Merced River Project are:

- Eliminate or isolate juvenile salmon predator habitat.
- Improve the adult and juvenile migratory path.
- Increase the quantity and quality of spawning habitat for chinook salmon by adding spawning gravel, reconfiguring spawning beds, and the river course.
- Increase the quantity and quality of rearing habitat for chinook salmon by increasing available in-channel diversity.
- Improve river and floodplain dynamics by reconfiguring the channel to better conform with the present flow regime.
- Create and enhance riparian and seasonally inundated vegetation by increasing the area within the project site that will be wetted by the river during high flows.

The Robinson site is located from RM 42 to 44. The area is characterized by an upstream section with an abandoned point bar and incised channel, a wide, flat, shallow central reach and several in-stream ponds in the downstream reach. The current alignment bypasses much of the pre-1997 channel, and, therefore most of the coarse sediment and existing spawning and rearing habitat. This reach has several gravel pits that provide habitat for non-native warmwater fishes, a highly braided channel, several abandoned channels, and exhibits sheet flow in areas that lack a defined channel. The lack of a defined channel made it necessary for CDFG to cut an emergency channel through the area to allow for Fall-run chinook salmon passage.

Approximately 12,200 feet of channel will be modified to create: 21,900 yds² of spawning habitat; incorporation of spawning riffles, runs, and pools; and a meander that

fits the current flow regime. Approximately 64.9 acres of salmonid predator habitat will be removed by filling instream ponds. The floodplain would be enhanced and revegetated with native riparian plant species, increasing the available riparian habitat in the area. Several scour channels will also be constructed, which are intended to act as seasonal wetlands. An estimated 1 million tons of on-site material will be manipulated during construction. Construction in this reach will require two full summer seasons. Construction is scheduled to begin in May 2001 and will likely run through to September 2001, will resume in May 2002, and will be completed in September 2002.

MONITORING AND EVALUATION

The principal objective of this project is to return this reach of river to anadromous fish habitat to improve the survival of out-migrating fall run chinook salmon smolts.

Additional objectives are:

- 1) to create salmonid spawning and restore rearing habitat;
- 2) to improve existing salmonid spawning and rearing habitat;
- 3) to improve chinook salmon migratory pathway;
- 4) to improve floodplain and river dynamics in the lower Merced River.

In order to determine if the principal and first three additional objectives of the project are met, the following biological monitoring techniques will be conducted three times before project construction and for (at least) three years following project completion:

- Several groups of MadaJet and Photonic marked and coded wire tagged salmon smolts will be released in the Merced River above the project site and recovered (trapped) in rotary screw traps below the project site; survival rates and migration rates (distance/time) will be estimated.
- Temperature profiles of the Merced River will be taken above and below the project site; pre and post project data will be compared;
- Water quality monitoring in the Merced River below the project site will be conducted during the post project monitoring;
- Visual survey (escapement survey) of spawning activity at the project site; pre and post data will be compared.

Biological/Fisheries Monitoring Plan and Quality Assurance Program

Objective 1 of this project is to improve the survival of out-migrating, fall-run chinook salmon smolts.

Hypothesis 1: Following restoration at the project site, physical water quality; water velocity, depths and temperature conditions will become more favorable for anadromous and resident salmonids.

Monitoring/Data collection: Physical characteristics of the specific reaches will be analyzed utilizing a portable Hydrolab[®]. This will record temperature and basic water quality at suitable locations within the study reaches that will be collected monthly. Flow velocities and depths, evaluated in a separate program, will be incorporated into this evaluation.

Hypothesis 2: As a result of changes in physical conditions more salmon smolts will survive through the project site after the project is completed.

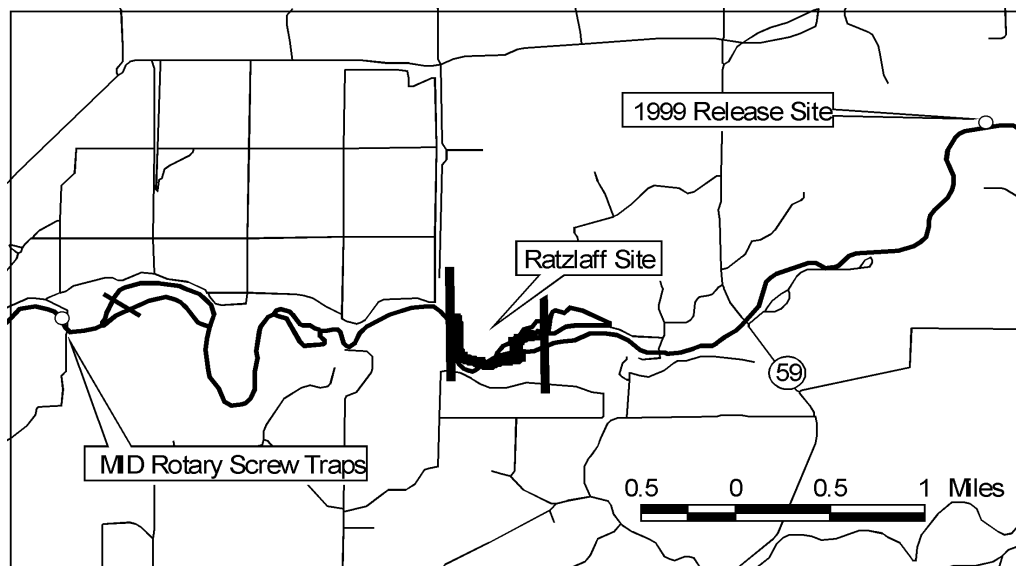


Figure1. Merced River, 1999 release sites and recovery site

Pre-project release will be done as part of the Ratzlaff Reach monitoring during the spring 2000-2002 out-migrant seasons. Robinson Reach post-project will occur during spring out-migrant seasons 2003-2005. For these studies, 3 specific reaches will be tested to evaluate survival of chinook salmon smolts. The reaches will incorporate both restored and unrestored reaches as controls. Evaluated reaches will include the Merced River Hatchery to Snelling (Hatchery Reach), Snelling to Robinson/Gallo (Snelling Reach), and Robinson/Gallo to the RSTs (Robinson/Gallo Reach) (figure 2).

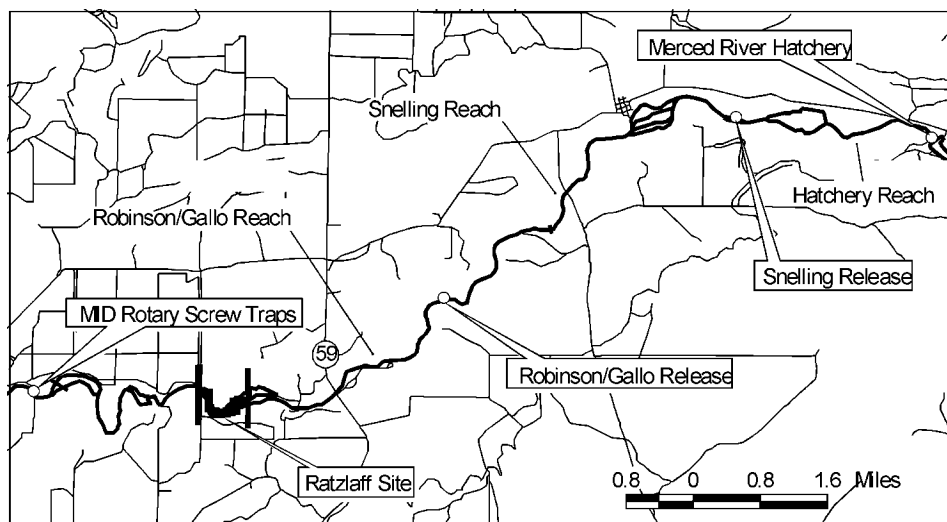


Figure 2. Merced River, 2000-2003 reach evaluation and release sites

The Snelling and Robinson/Gallo reaches have roughly equal numbers of diversions. Table 1 indicates the distance from the release sites to the RSTs.

Release Site	Distance to recapture site
Merced River Hatchery	15 miles
Snelling	12 miles
Robinson/Gallo	7 miles
Efficiency	.5 mile

Table 1. Distance from release sites to the RSTs.

Evaluation will be conducted by releasing fish above each specific reach to be captured at the RSTs. An efficiency release will occur 0.5 miles upstream from the RSTs to determine trap vulnerability (efficiency). All releases are timed so that re-capture will occur at roughly the same time owing to similar conditions for the test and control reaches. Survival rates from each release site will be analyzed appropriately to establish an estimate of survival along each reach. Releases will be conducted according to table 2.

Day 1: Evening Release Hatchery Reach Joaquin for	90,000 coded wire tagged fish released from the Merced River Hatchery. (These fish are part of a larger San Basin release and recoveries at the RSTs will be utilized for project monitoring). 2 releases.
Day 2: Morning Release Snelling Reach	5,000 Photonic marked fish released from Snelling. 3 releases
Day 2: Evening Release Robinson/Gallo Reach	3,000 Photonic marked fish released from Robinson/Gallo. 3 releases.
Day 2: Evening Release Efficiency	2,000 Photonic marked fish released for efficiency testing of the RSTs. 3 releases.

Table 2. Release details. Release numbers are per release

These test periods will evaluate the treatment reach (Robinson/Gallo) and two control reaches (Hatchery and Snelling). The Hatchery Reach will be tested a third time if an appropriate number of fish can be marked for re-capture as fish availability is uncertain late in the season. Each test period will evaluate a different streamflow/water temperature condition. Release numbers increase with distance from the traps to maximize recoveries.

This testing process is similar to other reach-specific testing occurring in the San Joaquin Basin and is performed in conjunction with basin-wide survival evaluations. Survival and migration rates will be determined using a variety of techniques including the use of Program MARK software (Burnham K.P. and White G.C., 1997). These values will be compared to pre-project survival rates and rates among restored and unrestored reaches. A statistician will be engaged in the final design and evaluation of this program.

Objective 2 is to improve and increase salmonid spawning habitat.

Hypothesis 1: The ratio of downstream temperature to upstream temperature will decrease after the project is completed.

Monitoring/Data collection: Onset temperature recorders were placed in the Merced River at several appropriate locations at the beginning of project construction. These will evaluate temperature effects above, below, and within

the restored reach. A portable Hydrolab will evaluate the pond that will be isolated after the project is completed. Temperature recorders will be downloaded every 4 months and a temperature profile of the reach and the pond will be developed. Temperature recorders will remain in place for 4 years. Pre and post-project data will be compared and analyzed. Analyses will use an accepted temperature model to incorporate temperature profiles into salmonid habitat preferences. Physical cross sectional data, collected for geomorphic evaluation, will also be used to document changes in fish habitat.

Hypothesis 2: Spawning activity (number of redds and live fish) will increase within the project reach.

Monitoring/Data collection: Monitoring of the annual fall-run chinook salmon escapement is currently an objective of DFG's San Joaquin Valley Southern Sierra Region personnel. DFG annually estimates and monitors the adult chinook salmon escapement in the Merced River. Data currently gathered includes:

- A mark/recapture study to estimate population size, record fish lengths and determine sex.
- Estimation of the number and temporal distribution of redds per riffle.

These escapement surveys would continue and this data will be utilized to evaluate the biological changes associated with the project construction.

Coordination and integration: DFG, in conjunction with MID and other stakeholders, are developing a river-wide fishery monitoring plan. At this time rotary screw trapping takes place at 2 locations on the Merced River. Smolt survival studies using coded wire tags (cwt) and MadaJet marked fish have been established. Annual salmon escapement surveys have documented populations since 1953. These activities are expected to be integrated into the river-wide monitoring plan.

The monitoring at the Robinson site has been designed to compliment existing river-wide monitoring programs. It will also give biologists a chance to develop new methods and techniques (tagging, Program MARK analyses and numerical maximum likelihood statistics) for evaluation of salmon smolt survival, migration rates, and probability of individual capture. Also, the Robinson site is the second of a series of projects that will reconstruct 4.5 contiguous miles of the Merced River near Highway 59. As each sub-project is constructed, continued and additional monitoring of this 4.5 mile reach is planned. The monitoring proposed here will "dovetail" into the future monitoring plan for this reach providing a truer evaluation of project success or failure and eventually salmon productivity. Major and minor equipment purchased for this project will be utilized during monitoring of future projects in this and other reaches.

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Appendix E Geomorphologic Monitoring Plan

Monitoring of Physical Processes

In order to evaluate project success, the following issues will be addressed during the monitoring program.

A. Reference Site = pre-project condition. Topographic survey of project. Transect taken at places where information can be placed into PHABSIM to determine usable fish (salmonid, bass and squawfish) habitat.

B. Project Site Specific

1. Collection of post- project conditions (as-built project).
 1. Pebble counts and bulk samples taken on point bars and riffles.
 2. Cross sections. Transect taken at places where information can be placed into PHABSIM to determine usable fish (salmonid, bass and squawfish) habitat.
 3. Install scour chains on riffles.
 4. Gravel permeability
2. After first event over 3,000 cfs.
 5. Pebble counts on riffles and point bars.
 6. Cross section...integrated into PHABSIM
 7. Monitor outside on curves for lateral migration.
 8. Reset and evaluate of scour chains/depth of bed movement
 9. Gravel permeability
3. After first events greater than 7, 000 cfs
 10. Pebble counts on riffles and point bars.
 11. Topographic survey if it appears there has been a large movement Cross sections integrated into PHABSIM
 12. Monitor outside on curves for lateral migration.
 13. Reset and evaluate of scour chains/depth of bed movement
 14. Gravel permeability
4. After 5years, 10 years and 15 years.
 15. Pebble counts and bulk sample analysis
 16. Topographic survey of project. Cross sections integrated into PHABSIM.
 17. Reset and evaluate scour chains.
 18. Gravel permeability
5. Monitoring report after each monitoring episode. PHABSIM run with measurement collected from physical monitoring.
6. If site is modified after one of the above evaluations, monitoring of the newly constructed site will be preformed as above.

Appendix F
Revegetation Monitoring Plan for the Merced River Salmon Habitat
Enhancement Project, Robinson Reach

Purpose

Monitoring will be done to fulfill the USACOE permit requirements

Procedure

Surveys to determine percent cover may be conducted once a year for 5 years, in the summer months, when growth is at a maximum. Surveys will be conducted at the same time each year. Since the areas being surveyed are linear in nature, monitoring may be performed by establishing permanent transects the length of the project with 30 1 meter square quadrats sampled for each transect. In addition, permanent photo points will be established to provide a consistent photographic reference.

Appendix G

Cultural Resources Report

**Cultural Resource Study for the Merced River Salmon Habitat Enhancement
Project Robinson Reach Site, Merced County, California**

Prepared by:

**California Department of Water Resources, Environmental Services Office
Contact: Sara Atchley, Associate State Archaeologist
3251 "S" Street
Sacramento, CA 95816
916-227-2024**

August 2000

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INTRODUCTION

This report documents the results of a cultural resource study conducted for the Merced River Salmon Habitat Enhancement Project Robinson Reach Site in Merced County, California. The project is a joint undertaking between U.S. Fish and Wildlife Service (USFWS), California Department of Water Resources (DWR), and California Department of Fish and Game (CDFG); with CDFG acting as the lead state agency, and USFWS acting as the lead federal agency. As the project is both state and federal, this cultural resource study is being conducted to satisfy the requirements of the California Environmental Quality Act (CEQA), and the National Historic Preservation Act (NHPA). A single cultural resource, pier remains of the Yosemite Valley Railroad, was recorded within the project area, and was considered ineligible for listing in the National Register of Historic Places. Thus this study concludes that no historic properties will be affected by the current project.

PROJECT DESCRIPTION

The proposed project area, located on the eastern side of the San Joaquin Valley in Merced County, approximately 4 miles downstream from the town of Snelling, is on the Merced River between river miles 42 and 44, just upstream of the Highway 59 bridge. The Merced River has undergone extensive modification over the years to provide agricultural and municipal water supply, flood control, power generation, and raw materials such as gravel products and gold. The manipulation of the river and its resources has led to loss and degradation of native habitat. There have been several impacts to salmon in particular. With the building of dams, access to spawning grounds upstream has been lost, and gravel recruitment is greatly reduced in reaches below the dams. The proposed project, if approved would: isolate or eliminate habitat for non-native predators of juvenile salmon; increase the quantity and quality of spawning habitat for Chinook and Steelhead salmon; improve anadromous fish passage; improve river and floodplain dynamics; and create and enhance the riparian corridor.

The current project area consists of a wide, flat, shallow upstream reach and several in-stream ponds in the down stream reach, characterized by low gradient stream patterns and abandoned floodplain terraces. The current alignment bypasses much of the original channel, and therefore, much of the coarse sediment and existing spawning and rearing habitat. In addition, the project area has been impacted by several gravel pits that were excavated within the last 40 years. These pits were excavated to an approximate depth of 15-25 feet, which is about 10 feet below the current water level in some areas. The berms that separated the river and gravel pits have degraded over the years to become low islands along the river channel.

Approximately 12,200 feet of channel will be modified to create 21,900 square yards of spawning habitat; incorporation of spawning riffles, runs, and pools; and a meander that fits the current flow regime. Approximately 64.9 acres of salmonid predator habitat would be removed by filling instream ponds and isolating two large

adjacent ponds using setback berms. The floodplain would be enhanced and revegetated with native riparian plant species, increasing the available riparian habitat in the area. Several scour channels will also be constructed, which are intended to act as seasonal wetlands. An estimated 1 million tons of on-site material will be manipulated during construction.

CULTURAL BACKGROUND

Prehistoric Context

The prehistory of the Central Valley region has been approached in two fundamentally different ways. The initial chronological sequence was established by Heizer and Fenenga (1939). Simply called the Early, Middle, and Late Periods, these were defined by shifting patterns in site assemblages and mortuary morphology (Moratto 1984). This chronological framework was later refined and eventually became the Central California Taxonomic System (CCTS) which, to be consistent with the Midwest Taxonomic System, substituted the term "horizon" for "period."

The second approach grew from the archaeological patterns developed from the CCTS. As absolute dates became available for sites with early, middle, and late assemblages, it was discovered that sites with different assemblages actually were contemporaneous. This new scheme used the same archaeological characteristics as the CCTS to differentiate sites, but ordered sites into functional groups rather than temporal ones. This second, more functional approach was advanced by Fredrickson (1973), who used the term "pattern" to describe an "adaptive mode extending across one or more regions, characterized by particular technological skills and devices, and particular economic modes." Three patterns were introduced: Windmill, Berkeley, and Augustine. These patterns, while generally corresponding to the Early, Middle, and Late horizons within the Central Valley, were conceptually different and free of spatial and temporal constraints.

The summary of the archaeology for the Central Valley region follows a temporal outline using the Early, Middle, and Late Horizons, but incorporates the Windmill, Berkeley, and Augustine patterns. Additionally, the three patterns/horizons are preceded by what has been termed the Farmington Complex or the Western Pluvial Lakes Tradition (Moratto 1984).

Farmington Complex/Western Pluvial Lakes Tradition (10,000-4,500 B.P.)

Archaeological evidence of human use of the Central Valley during the late Pleistocene and early Holocene is scarce. Although rare, the archaeological remains of human activity has been identified (Johnson 1967, Treganza and Heizer 1953). Most Pleistocene-Holocene era sites are deeply buried in the gravels and silts that have

accumulated in the Central Valley from erosion and river flooding during the last 5,000 years or have eroded away.

The economy of Central Valley residents during the late Pleistocene is thought to be based on the hunting of large Pleistocene mammals. Although no direct evidence of this exists in the Delta, the similarity of the artifact assemblages with those of other locations in western North America where the association can be demonstrated supports this argument. Much of the Pleistocene megafauna became extinct at the Pleistocene-Holocene transition due to warming temperatures, rising sea levels, and changing precipitation patterns (Moratto 1984).

Early Horizon/Windmill Pattern (4,500-2,500 B.P.)

During the Early Horizon, in order to survive without large game, people had to change their food procurement strategies to make use of a more diverse range of smaller plants and animals. This reliance on a diverse number of smaller plants and animals had several consequences. First, people had to move around from one area to another to take advantage of the seasonal availability of particular resources. Second, large areas of land were needed to ensure that enough resources were available during all times of the year. Third, more specialized tools were necessary to procure and process the wider range of plants and animals that were being used (Moratto 1984).

Artifacts and faunal remains at Windmill sites reflect this diverse range of resource exploitation including seeds, a variety of small game, and fish. The material culture assemblage includes large spear and projectile points; trident fish spears; at least two types of fishhooks; quartz crystals and numerous charmstone styles; and a baked clay assemblage that included net sinkers, pecan-shaped fish line sinkers, and cooking balls. Groundstone included manos and metates, as well as mortars and pestles. The bone tool industry appears minimal but includes awls, needles, and flakers. People with a Windmill adaptation buried their dead in formal cemeteries, both within and separate from their villages, in a ritual context that included the use of red ochre, often rich grave offerings, and ventral extension with a predominantly western orientation (Moratto 1984). Settlement patterns during the Windmill Pattern reflect a seasonal adaptation. Habitation sites in the valley were occupied during the winter, but populations moved into the foothills during the summer months (Moratto 1984).

Middle Horizon/Berkeley Pattern (2,500-1,000 B.P.)

During the Middle Horizon, resource specialization becomes readily visible in the archaeological record. The Berkeley Pattern differs from the preceding Windmill Pattern primarily in its greater emphasis on the exploitation of the acorn as a staple. The increased acorn use is reflected in the more numerous and varied mortars and pestles. Although gathered resources are more important during this period, projectile points and atlatls indicate that hunting was still an important activity (Fredrickson 1973). This Berkeley Pattern is also noted for its especially well-developed bone industry and for such technological innovations as ribbon flaking of chipped stone artifacts. People in this

period were more sedentary than they had been in the past, and village sites are found through the valley along rivers and near other areas with permanent sources of water. Although resources and commodities were being exchanged through the region prior to this period, it is during this period that more extensive and more frequently used economic networks developed. Transported resources included foods, shell, and lithic materials. During this era, flexed burials replaced extended burials and the use of grave goods generally declined (Moratto 1984).

Late Horizon/Augustine Pattern (1,000-1,800 B.P.)

The Augustine Pattern begins a change in subsistence and land use patterns to those of ethnographically known peoples of the historic era. This pattern exhibited a great elaboration of ceremonial and social organization, including the development of social stratification.

Ethnographic Context

The project area is located within the territory of the Northern Valley Yokuts. The Northern Valley Yokuts inhabited the Northern San Joaquin Valley from the Calaveras River in the north, to the crest of the Mount Diablo Range in the east, to the transverse San Joaquin River segment in south, and to the juncture of the Central Valley floor with the Sierra Nevada foothills in the east (Wallace 1978).

The San Joaquin River and its tributaries formed the core of the Northern Yokuts homeland. Given their close identification with the river, Northern Yokuts livelihood centered around fishing. Salmon, mentioned in several historical accounts, was likely the most sought after fish. Other available fish include, white sturgeon, river perch, western suckers, and Sacramento pike (Wallace 1978).

Next to fishing, fowling was another important food source. Geese, ducks, and other aquatic birds, offered easy prey to the hunter. Big game hunting probably constituted a marginal rather than an important subsistence activity. The harvesting of wild plant foods was also of prime importance. Acorns were gathered in quantity from valley oaks, ground into meal, and cooked in the form of thick soup or gruel. Tule roots were also gathered and ground into meal (Wallace 1978).

Most Northern Valley Yokuts settlements were situated on top of low mounds, on or near the banks of large watercourses. The elevated positions helped to keep the inhabitants and their houses above the waters of the spring floods. A strong tendency toward sedentary life, fostered no doubt by abundant riverine resources, was evident, with the same sites occupied for generations. Flooding posed the chief threat to a fully stationary existence. Rivers periodically overflowed their banks and drove the villagers to even higher ground (Wallace 1978).

European contact proved disastrous for the Northern Valley Yokuts. During the Spanish-Mexican period, 1769-1846, there was a gradual erosion of aboriginal culture, in addition to a progressive decline in population. The years immediately following the American conquest of California and the gold rush brought nearly total destruction to the native population. The process of extinction and cultural breakdown began when the valley peoples were drawn into the mission system. Intense proselytizing among the lower San Joaquin tribes began around 1805 and continued into the early 1820s.

Compelled to work at unfamiliar tasks and subjected to the restrictive routine and severe discipline of mission life, many of the missionized Indians deserted and returned to their homelands. These mission refugees and interior tribes grew hostile, and horse stealing and raiding ensued. Dozens of retaliatory expeditions were sent out by local officials. These met with very little success; some natives were killed, a few villages were burned, but the theft of livestock continued unabated. Poses organized by ranchers often turned into slave-raiding parties, which brought back women and children to serve as laborers.

Decimation occurred in the summer of 1833 when a pestilence swept the valley and claimed thousands of lives. Entire communities disappeared and certain tribes were wiped out. The disease, evidently transmitted by beaver trappers from the Columbia River, has been identified as malaria (Wallace 1978).

Annihilation of the Indians came a few years after the American conquest of California in 1846, largely the result of the 1849 Gold Rush. While the northern San Joaquin was not gold country, thousands of prospectors bound for the southern mines passed through, relentlessly pushing aside many natives in their path. After the initial upheaval, the rich fertile soils of the delta and the valley attracted farming. As they filled up the area, the remaining Yokuts were driven off their hunting and food-gathering lands.

Plans for a reservation system were drawn up in 1850, however pressure from the new state of California prevented the treaties from being ratified. The rejection of the treaties left nothing for the remaining tribes to do except drift about, scrambling for an existence as best they could. (Wallace 1978).

Historic Context

Merced County, first organized in 1855, was named after the river that explorer Gabriel Moraga called El Rio de Nuestra Senora de la Merced, "The River of Our Lady of Mercy." The county seat, first located on the Turner and Osborn Ranch, was moved to Snelling's Ranch in 1857, and then finally moved to Merced in 1872 (Hoover et al. 1966).

Settlers came to the rivers and streams of eastern Merced County and established homesteads during the late 1840s (Hoover et al. 1966). The vast fertile areas along the streams were used for livestock raising and agriculture, and often the ranch houses along the through roads became inns. The first bona fide American settlers in Merced County

were John M. Montgomery and Colonel Samuel Scott, two Kentuckians. In the fall of 1849 they camped under a large oak tree on the banks of the Merced River a short distance north of the Cox Ferry Bridge on the west side of Highway 59, nor far from the present town of Snelling. Montgomery became the richest man Merced County during his time and was known as the "Land and Cattle King of Merced," the predecessor of the famed Miller and Lux cattle ranchers.

Early in the spring of 1851, Montgomery and others established a house of entertainment, later known as the Snelling Hotel, which was the beginning of the town of Snelling. In 1857 Snelling's Ranch replaced the Turner and Osborn Ranch as the site of the county seat, but in 1872 it was moved to the town of Merced, 15 miles south. Snelling, although not a mining town, was of importance at the time, being on the well-traveled road to the Mariposa Mines.

Another center of trade in eastern Merced County was Merced Falls. Merced Falls was one of the principal crossings on the Merced River along the route of the old Stockton-Fort Miller Road. A flour mill and a woolen mill, indicative of two of the county's most important early industries, were located there until 1893. The lumber mills of the Yosemite Lumber Company were later located there, but now Merced Falls is a ghost town.

Yosemite Valley Railroad

The purpose of the Yosemite Valley Railroad Company, established in 1902, was to provide transportation between Merced County and Yosemite Valley (Johnston 1995). Survey work for the line was completed in 1905, and construction of the railroad was completed in 1907. The finished route was 78.43 miles long, with the western terminus of the line in Merced and the eastern terminus in El Portal.

Besides Yosemite tourism, other focuses of the railroad was the mineral wealth of the Merced River Canyon and the dense sugar pine stands of the central and southern Sierra (Johnston 1995). The Yosemite Lumber Company transported lumber to its mill in Merced Falls via the Yosemite Valley Railroad (YVRR). The first trainload of logs traveled down the YVRR in 1912. In the first year of operation the Yosemite Lumber Company sent out 7000 carloads of lumber. The Yosemite Lumber Company produced a high of 70,000,000 board feet in 1923. After 1923, available timber dwindled fast, and in 1927 the Merced Falls mill was closed. In 1934 the new Yosemite Sugar Pine Lumber Company was formed and in 1935 resumed operations. This cutting of timber persisted until 1942 when it was apparent that most of the available sugar pine had been exhausted and the last load of logs rolled down the tracks (Isaacs 1989).

The other industry served by the YVRR was the mining industry. In 1910, the El Portal Mining Company began mining barium (Unrau 1998). Barite was used to "weight" drilling muds during oil drilling operations. This was the first, and for a long time, the only barite mined commercially in California and provided 96 percent of all barites used in California oil drilling operations. After the close of the railroad in 1945,

barium was shipped out of the canyon by truck. This eventually proved to be very expensive and the cost forced the mines to cease operations in 1951. Today, all that remains of the mining operation are mine shafts, foundations, and collapsed incline supports (Unrau 1998).

Another prominent mining venture that profited from the development of the railroad was the Clearinghouse Mine, which was a conglomeration of different patented mining claims (Shoup 1998). One of these, the Ferguson Mine established in 1907, operated by electrical power generated from water transported by flume to a turbine and eventually by diesel power. In time, this location became a small village which included a post office, barracks, houses, a mill, blacksmith shop, assay office, powder houses, transformer shed, mess hall, and a saw mill. This mine operated until 1937 when the December 1937 flood washed out the YVRR. During its operation, the mine produced abundant quantities of gold, silver, copper, and lead (Shoup 1998).

In addition to industry, the selling of merchandise to locals was also a result of the YVRR. In 1909 William M. Brice and his family opened a general merchandise store on the banks of the Merced River across from the mouth of Bear Creek. This location soon had a post office and school, and it became a regular stop on the YVRR, as well as providing services to miners, ranchers, and Native Americans who lived in the area.

METHODS AND FINDINGS

The cultural resource study of the project area included a record search at the California Historic Resources Information System (CHRIS), contacting the Native American Heritage Commission (NAHC) and interested Native American parties, field survey of the project area, and evaluation of significance for cultural resources. Each of these will be discussed below.

Record Search

The record search was completed by CHRIS Central California Information Center staff on May 5, 1999. The record search included a review of the National Register of Historic Places, the California Register of Historical Resources, the California Inventory of Historic Resources, the California Historical Landmarks, the California Points of Historical Interest, the Historic Property Directory, the Caltrans Local Bridge Survey, the Survey of Surveys, GLO Plat maps, archaeological site and survey maps, and archaeological site and survey reports.

The CHRIS search revealed that no previous cultural resources or cultural resource surveys have been documented within the project area. However, located within a 1/4 mile radius of the project area are 5 historic-era cultural resources: an unrecorded segment of the Yosemite Valley Railroad, a bridge, two old road segments, and "fences."

Native American Consultation

The Native American Heritage Commission (NAHC) was contacted to obtain information from their sacred lands files as well as to obtain a list of Native American individuals and other organizations potentially interested in the project. All parties identified by the NAHC were contacted by letter; DWR has received no responses from these parties to date.

Field Survey

A pedestrian field survey of the project area was conducted on August 9, 2000 by Robert Orlins, DWR Associate State Archaeologist, Sara Atchley, DWR Associate State Archaeologist, and Randy Mager, DWR Environmental Specialist. Because the project area is situated entirely within the active and old stream bed of the Merced River and its flood plain, intensive survey was not warranted. Thus, the project area was covered using an intuitive survey strategy, including cursory coverage of the stream bed, and more intensive coverage of areas with more likelihood for resources such as the river banks, islands, and flood plains.

One cultural resource was located within the project area. The resource consists of pier remains from the Yosemite Valley Railroad. The remains include 6 cylindrical concrete piers twenty-five feet in height, and sixteen wooden posts ranging from six inches to 10 feet in height. The cylindrical concrete piers have wooden log centers, and were encased in sections of riveted sheet iron. The piers have severely deteriorated: two of the piers have fallen into the stream bed, and approximately 95% of the outer iron sheeting has eroded. In addition, sections of the concrete are breaking off. The resource was recorded on the appropriate Department of Parks and Recreation forms and submitted to the CHRIS Central California Information Center for processing.

Evaluation of Significance

Cultural resource significance for the Yosemite Valley Railroad pier remains was evaluated in terms of eligibility for listing in the National Register of Historic Places (NRHP). NRHP significance criteria applied to evaluate the cultural resources in this study are defined in 36 CFR 60.4 as follows:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that

- a. are associated with events that have made a significant contribution to the broad patterns of our history;
- b. are associated with the lives of persons significant in our past;

- c. embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; possess high artistic values; or represent a significant and distinguishable entity whose components may lack individual distinction; or
- d. have yielded, or may be likely to yield, information important in prehistory or history.

Although the Yosemite Valley Railroad was historically significant in the economic development of Merced County, the San Joaquin Valley, and of Yosemite Valley, the piers are severely deteriorated (two of them have tumbled into the river bed), and there is no remaining associated superstructure, rail bed, trestle, track, or ties. Thus, due to lack of integrity, the Yosemite Valley Railroad pier remains located in the project area are considered ineligible for listing in the NRHP.

CONCLUSIONS

A single cultural resource, pier remains of the Yosemite Valley Railroad, was recorded in the project area. The remains were recorded on DPR 523 forms and were photographed. The Yosemite Valley Railroad was historically important in the economic development of Merced County, San Joaquin Valley, and of Yosemite Valley, however, the pier remains are severely deteriorated and are of poor integrity. Thus, the pier remains located in the project area are considered ineligible for listing in the NRHP, and no historic properties will be affected as a result of the current proposed undertaking.

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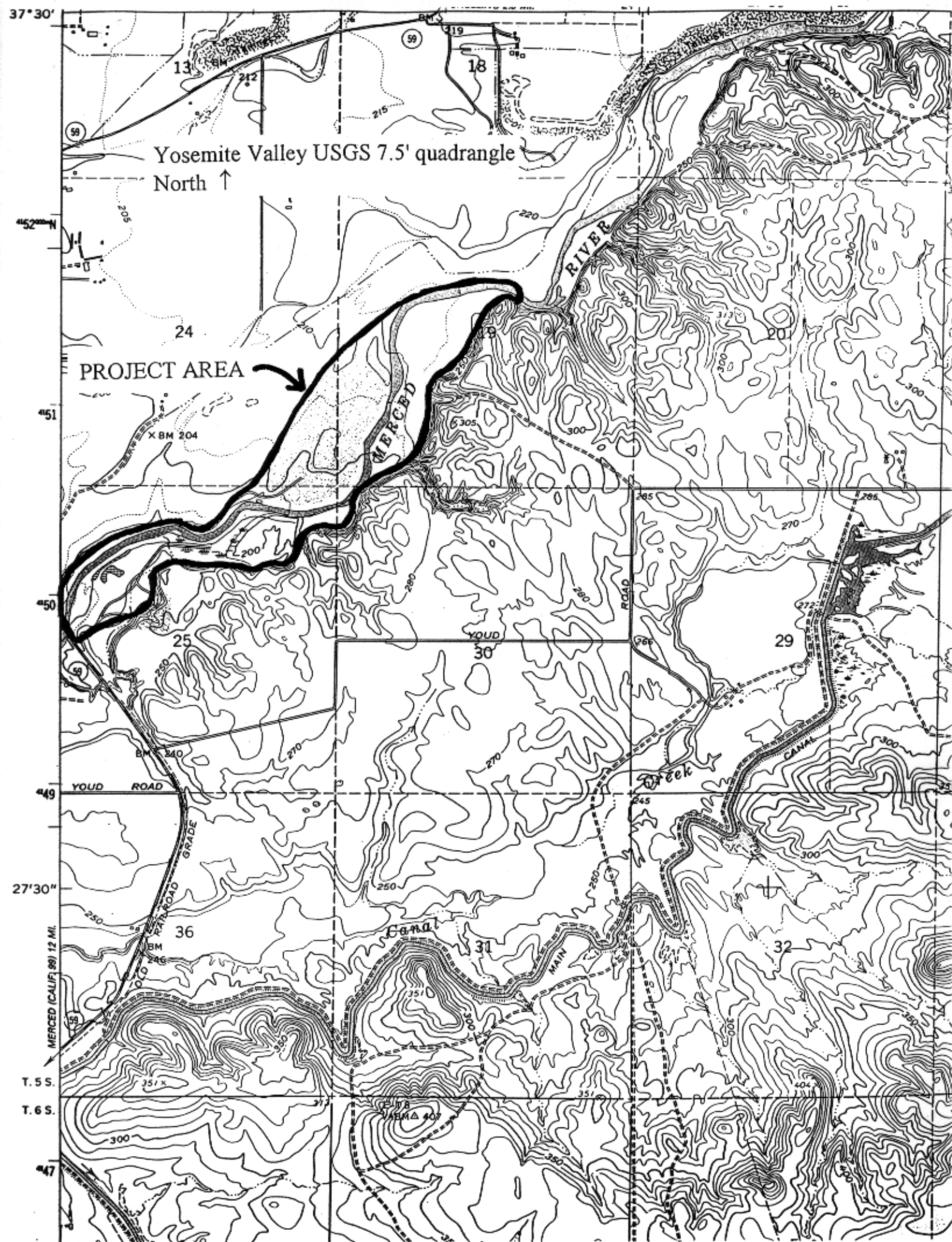
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Smithsonian Institution, Washington D.C.



ATTACHMENT:

Native American Contact Letters

STATE OF CALIFORNIAGray Davis, Governor**NATIVE AMERICAN HERITAGE COMMISSION**

915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390



August 14, 2000

Sara Atchley
Department of Water Resources

RE: Robinson Project, Merced County

Sent By Fax: (916) 227-7554
Pages Sent: 2

Dear Ms. Atchley:

A record search of the sacred lands file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend other with specific knowledge. A minimum of two weeks must be allowed for responses after notification.

If you receive notification of change of addresses and phone numbers from any these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4038.

Sincerely,

A handwritten signature in dark ink, appearing to read "Nehmie Pilas-Treadway".

Nehmie Pilas-Treadway
Associate Governmental Program Analyst

NATIVE AMERICAN CONTACTS
Merced County
August 14, 2000

Lorrie Planas
2736 Palo Alto
Clovis, CA 93611
(559) 855-5355

Choinumri
Wobonuch Mono

American Indian Council of Mariposa County
Bill Leonard, Chairperson
P.O. Box 1200
Mariposa, CA 95338
209 968-0578 work

Miwok

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7080.5 of the Health and Safety Code, Section 5087.94 of the Public Resources Code and Section 5087.96 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regards to the cultural assessment for the proposed Robinson project, Merced County

DEPARTMENT OF WATER RESOURCES

1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791



American Indian Council of Mariposa County
P.O. Box 1200
Mariposa, CA 95338

Dear Mr. Leonard,

The Department of Water Resources is conducting environmental and cultural resource studies for a proposed anadromous fish and habitat restoration project in Merced County, California. The proposed project area, located approximately 4 miles downstream from the town of Snelling, is on the Merced River between river miles 42 and 44, just upstream of the Highway 59 bridge. The proposed project will involve ground disturbing activity within the river channel and along the immediate flood plains. The project area has been surveyed by State Archaeologists, and no cultural resources were observed. I have enclosed a map showing the project area.

The State of California Native American Heritage Commission recommended that we contact you to provide an opportunity for you to contribute information about cultural resources in the study area. An important element of our investigation is to identify sites, resources, or locations that are of importance to the local Native American community. We would appreciate any information you have concerning these resources in the project area. If you cannot supply information but know of others who can, we would appreciate it if you would contact us with the names of these other individuals.

We encourage you to participate in this process. The potential impacts that this project may have on cultural resources important to the Native American community cannot be evaluated unless we are aware that these resources exist. Feel free to contact me with any questions or concerns.

Sincerely,

A handwritten signature in black ink, appearing to read "Sara M. Atchley".

Sara M. Atchley
Associate State Archaeologist

Enclosure

DEPARTMENT OF WATER RESOURCES

1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791



Lorrie Planas
2736 Palo Alto
Clovis, CA 93611

Dear Ms. Planas,

The Department of Water Resources is conducting environmental and cultural resource studies for a proposed anadromous fish and habitat restoration project in Merced County, California. The proposed project area, located approximately 4 miles downstream from the town of Snelling, is on the Merced River between river miles 42 and 44, just upstream of the Highway 59 bridge. The proposed project will involve ground disturbing activity within the river channel and along the immediate flood plains. The project area has been surveyed by State Archaeologists, and no cultural resources were observed. I have enclosed a map showing the project area.

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Sincerely,

A handwritten signature in black ink, reading "Sara M. Atchley", is positioned above the typed name.

Sara M. Atchley
Associate State Archaeologist

Enclosure

ATTACHMENT:

Site Record Forms

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code

Other Listings
Review Code

Reviewer

Date

Page 1 of 4

*Resource Name or #: Yosemite Valley Railroad Piers

P1. Other Identifier:

*P2. Location: ☐ Not for Publication ☒ Unrestricted

*a. County: Merced

and (P2b and P2c or P2d. Attach a Location Map as necessary.)

*b. USGS 7.5' Quad: Yosemite Lake

Date: 1987 T 55; R 13E ; ¼ of ¼ of Sec 25 ; M.D. B.M.

c. Address:

City:

Zip:

d. UTM: Zone: 10 ; mE/ mN (G.P.S.)

e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate) Elevation: From state Highway 99 exit at Merced. Take State Highway 59 north to the Merced River Bridge. The site is on the northeast side of the bridge.

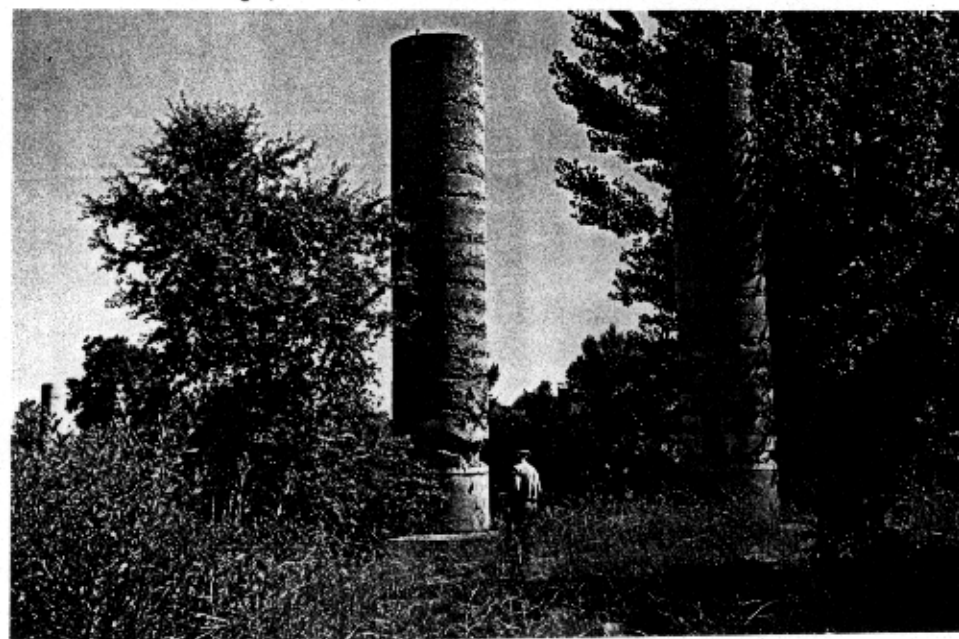
*P3a. Description: (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)
This resource consists of pier remains from the Yosemite Valley Railroad Merced River crossing. The site, approximately 800 feet N/S and 50 E/S, includes the remains of 6 cylindrical concrete piers and 16 wooden posts across the Merced River. The piers occur in 3 pairs from north to south, approximately 250 feet apart. The piers in each pair are roughly 12 feet apart and are aligned E/W. The piers, approximately 25 feet high and 3-4 feet in diameter, have rough-hewn wooden log centers and were encased in sections of riveted sheet iron. The concrete consists of cement and local river cobbles. In alignment with the concrete piers are a total of 16 rough-hewn wooden log posts, 12 inches in diameter, ranging in height from 6 inches to ten feet. There is no remaining superstructure, rail bed, trestle, track, or ties.

The piers are severely deteriorated: two of the piers have fallen into the river bed, and approximately 95% of the outer iron sheeting has eroded. In addition, sections of the concrete are breaking off.

*P3b. Resource Attributes: (List attributes and codes) AH2 Foundations/structure pads

P4. Resources Present: ☐ Building ☐ Structure ☐ Object ☒ Site ☐ District ☐ Element of District ☒ Other (Isolates, etc.)

P5a. Photo or Drawing (Photo required for buildings, structures, and objects.)



P5b. Description of Photo: (View, date, accession #) View north.

*P6. Date Constructed/Age and Sources: ☒ Historic ☐ Prehistoric
☐ Both

The Yosemite Valley Railroad was in operation from 1907-1945. Source: Hank Johnston 1995, Railroads of the Yosemite Valley.

*P7. Owner and Address:
Robinson Cattle Co. Snelling, CA

*P8. Recorded by: (Name, affiliation, and address)
S. Atchley
Department of Water Resources
Environmental Services Office
3251 S Street, Sacramento, CA
95816

*P9. Date Recorded: August 14, 2000

*P10. Survey Type: (Describe) General Reconnaissance

*P11. Report Citation: (Cite survey report and other sources, or enter "none.") Cultural Resource Study for the Merced River Salmon Habitat Enhancement Project Robinson Reach Site, Merced County, California. Report on file Department of Water Resources, Environmental Services Office, Sacramento, CA

*Attachments: ☐ NONE ☒ Location Map ☒ Sketch Map ☐ Continuation Sheet ☐ Building, Structure, and Object Record
☒ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record
☐ Artifact Record ☐ Photograph Record ☐ Other (List):

DPR 523A (1/95)

*Required information

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
ARCHAEOLOGICAL SITE RECORD

Primary #
Trinomial

Page 2 of 4

*Resource Name or #: Yosemite Valley Railroad Piers

*A1. Dimensions: a. Length: 800 feet (N/S) x b. Width: 50 feet (E/W)

Method of Measurement: ☒ Paced ☐ Taped ☒ Visual estimate ☐ Other:

Method of Determination (Check any that apply): ☐ Artifacts ☒ Features ☐ Soil ☐ Vegetation ☐ Topography
☐ Cut bank ☐ Animal burrow ☐ Excavation ☐ Property boundary ☐ Other (Explain):

Reliability of Determination: ☐ High ☒ Medium ☐ Low Explain:

Limitations (Check any that apply): ☐ Restricted access ☐ Paved/built over ☐ Site limits incompletely defined
☐ Disturbances ☒ Vegetation ☐ Other (Explain): Site is primarily situated within the Merced River bed channel.

A2. Depth: ☐ None ☒ Unknown Method of Determination:

*A3. Human Remains: ☐ Present ☒ Absent ☐ Possible ☐ Unknown (Explain):

*A4. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.):

This resource consists of pier remains from the Yosemite Valley Railroad Merced River crossing. The site, approximately 800 feet N/S and 50 E/S, includes the remains of 6 cylindrical concrete piers and 16 wooden posts across the Merced River. The piers occur in 3 pairs from north to south, approximately 250 feet apart. The piers in each pair are roughly 12 feet apart and are aligned E/W. The piers, approximately 25 feet high and 3-4 feet in diameter, have rough-hewn wooden log centers and were encased in sections of riveted sheet iron. The concrete consists of cement and local river cobbles. In alignment with the concrete piers are a total of 16 rough-hewn wooden log posts, 12 inches in diameter, ranging in height from 6 inches to ten feet. There is no remaining superstructure, rail bed, trestle, track, or ties.

*A5. Cultural Constituents (Describe and quantify artifacts, ecofacts, cultural residues, etc., not associated with features.): None

*A6. Were Specimens Collected? ☒ No ☐ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

*A7. Site Condition: ☐ Good ☐ Fair ☒ Poor (Describe disturbances.):

The piers are severely deteriorated: two of the piers have fallen into the river bed, and approximately 95% of the outer iron sheeting has eroded. In addition, sections of the concrete are breaking off.

*A8. Nearest Water (Type, distance, and direction.): The site is situated within the Merced River channel.

*A9. Elevation: 200 feet above sea level

A10. Environmental Setting (Describe culturally relevant variables such as vegetation, fauna, soils, geology, landform, slope, aspect, exposure, etc.): The site is situated within the Merced River channel amongst low, rolling hills in the eastern edge of the San Joaquin valley. While the surrounding vicinity is predominately agricultural fields, the immediate environment consists of riparian habitat: Johnston's grass, Valley Oak, blackberry, cottonwood, tule and wild grape.

A11. Historical Information:

The Yosemite Valley Railroad was in operation from 1907 to 1945. The railroad is 78.43 miles long with the eastern terminus in El Portal and the western terminus in Merced. The railroad served Yosemite tourists, logging and mining companies, and general merchandise delivery to local residents and businesses.

*A12. Age: ☐ Prehistoric ☐ Protohistoric ☐ 1542-1769 ☐ 1769-1848 ☐ 1848-1880 ☒ 1880-1914 ☒ 1914-1945

☐ Post 1945 ☐ Undetermined Describe position in regional prehistoric chronology or factual historic dates if known:

The Yosemite Valley Railroad was in operation from 1907 to 1945 (Johnston 1995).

A13. Interpretations (Discuss data potential, function[s], ethnic affiliation, and other interpretations):

The Yosemite Valley Railroad piers functioned to carry the railroad across the Merced River. The piers are severely deteriorated (two of them have tumbled into the river bed), 95% of the iron encasing has eroded, concrete is breaking off, and there is no remaining superstructure, rail bed, trestle, track, or ties. The data potential of the piers is considered very low due to their poor integrity.

A14. Remarks:

A15. References (Documents, informants, maps, and other references):

Johnston, Hank 1995: Railroads of the Yosemite Valley

A16. Photographs (List subjects, direction of view, and accession numbers or attach a Photograph Record.):

Original Media/Negatives Kept at:

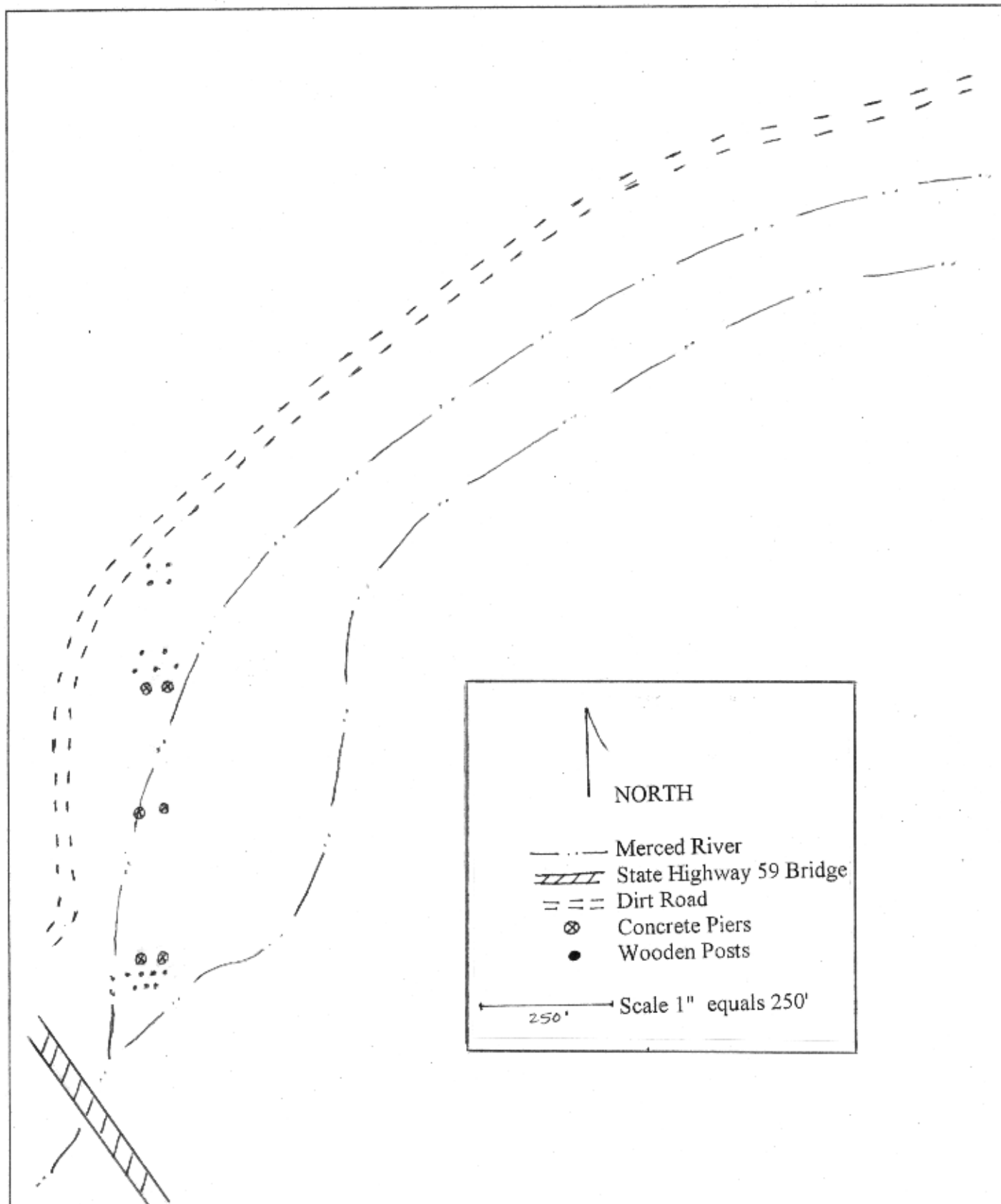
*A17. Form Prepared by: S. Atchley, Environmental Services Office

Date: Aug. 8, 2000

Affiliation and Address: State of California Department of Water Resources 3251 "S" Street, Sacramento, CA 95816

DPR 523C (1/95)

*Required information



NOTE: Include bar scale and north arrow.

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

Primary #
HRI#
Trinomial

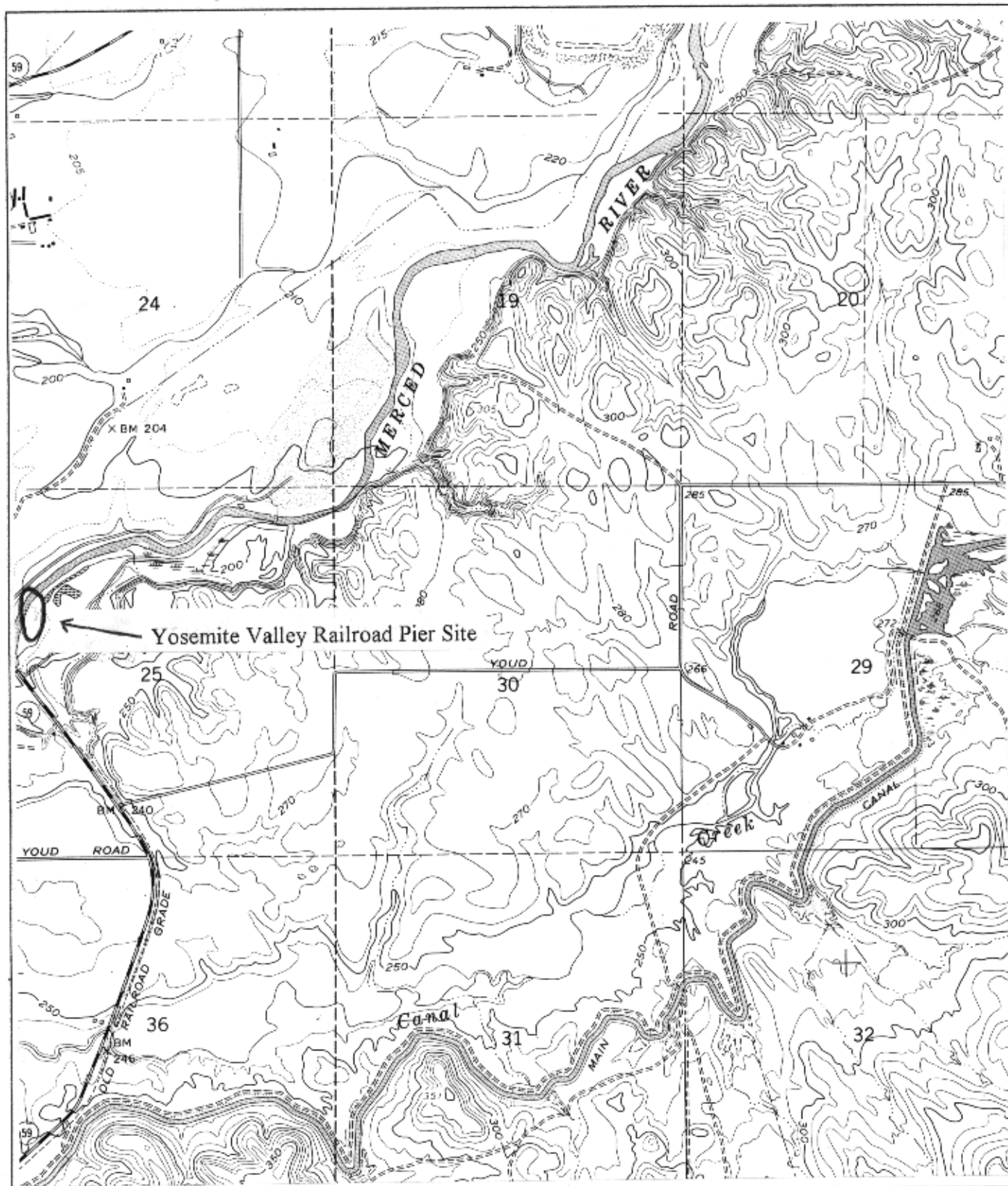
Page 4 of 4

*Resource Name or #: Yosemite Valley Railroad Piers

*Map Name: Yosemite Lake (20ft Contour)

*Scale: 1:24,000

*Date of Map: 1987



State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code

Other Listings
Review Code

Reviewer

Date

Page 1 of 3

*Resource Name or #: Ratzlaff Reach Pipe Segment

P1. Other Identifier:

*P2. Location: Not for Publication ☒ Unrestricted

*a. County: Merced

and (P2b and P2c or P2d. Attach a Location Map as necessary.)

*b. USGS 7.5' Quad: Winton

Date: 1987

T 5S

; R 13E; SW ¼ of

¼ of Sec 26 ; M.D.M. B.M.

c. Address:

City:

Zip:

d. UTM: Zone: 10 ; 710350 mE/ 4149580 mN

e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate)

Take State 99 to Keyes Rd. (County J16). East on J16 to Cox Ferry Rd. Right on Cox Ferry Rd. to J16. Left on J16 toward Snelling. Turn right on County Rd. 59. Approximately 3 miles turn right to Calaveras Mericals Co. (Aggregate Mining) just before crossing Merced River.

*P3a. Description: (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)
The resource is a water pipe segment; hot riveted, situated in the lower reach of the Merced River amongst brush and arboreal riparian habitat. The segment was exposed during construction of a berm for the Merced River Fishery Restoration Project (DWR). The top of the pipe is approximately 5 feet below the top of the berm. The pipe is now buried beneath the berm.

*P3b. Resource Attributes: (List attributes and codes) AH6, water conveyance system

*P4. Resources Present: ☐ Building ☐ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☒ Other (Isolates, etc.)

P5a. Photo or Drawing (Photo required for buildings, structures, and objects.)



P5b. Description of Photo: (View, date, accession #) Pipe from base of berm. 7/12/99

*P6. Date Constructed/Age and Sources: ☒ Historic ☐ Prehistoric
☐ Both
Unknown.

*P7. Owner and Address:
John Pierce Davis
P.O. Box 1646
Tonopah, NV 89049-1646

*P8. Recorded by: (Name, affiliation, and address)
Robert Orlins and Tamara Spear
California Department of Water
Resources, Environmental Services
Office
3251 S St. Sacramento, CA 95816

*P9. Date Recorded: July 12, 1999

*P10. Survey Type: (Describe)

Late discovery reconnaissance during berm construction.

*P11. Report Citation: (Cite survey report and other sources, or enter "none.")
none

*Attachments: ☐ NONE ☒ Location Map ☐ Sketch Map ☐ Continuation Sheet ☐ Building, Structure, and Object Record
☐ Archaeological Record ☐ District Record ☒ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record
☐ Artifact Record ☐ Photograph Record ☐ Other (List):

DPR 523A (1/95)

*Required information

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LINEAR FEATURE RECORD

Primary #

HRI #

Trinomial

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Resource Name or #: (Assigned by recorder) Ratzlaff Reach Pipe Segment

L1. Historic and/or Common Name: Ratzlaff Reach Pipe Segment

L2a. Portion Described: ☐ Entire Resource ☒ Segment ☐ Point Observation Designation:

b. Location of point or segment: (Provide UTM coordinates, legal description, and any other useful locational data. Show the area that has been field inspected on a Location Map)

Prior to the construction of the current Department of Water Resources project, the pipe would have been within the channel of the Merced River. UTM coordinates: 4149580 N/719350E

L3. Description: (Describe construction details, materials, and artifacts found at this segment/point. Provide plans/sections as appropriate.)

The resource is a steel water pipe segment; hot riveted. Segment exposed during construction of berm for Merced River Fishery Restoration Project by California Department of Water Resources. The top of the pipe is approximately 5 feet below the top of the berm. The pipe was covered in place during construction.

L4. Dimensions: (In feet for historic features and meters for prehistoric features)

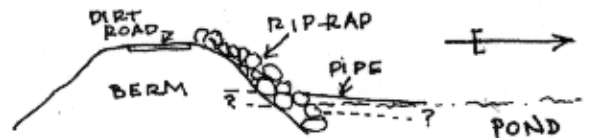
a. Top Width: Diameter 6 feet

b. Bottom Width: n.a.

c. Height or Depth: n.a.

d. Length of Segment: Approximately 10 feet

L4e. Sketch of Cross-Section (include scale) Facing: North
No scale



L5. Associated Resources:

There are tailings piles in area of gold dredging.

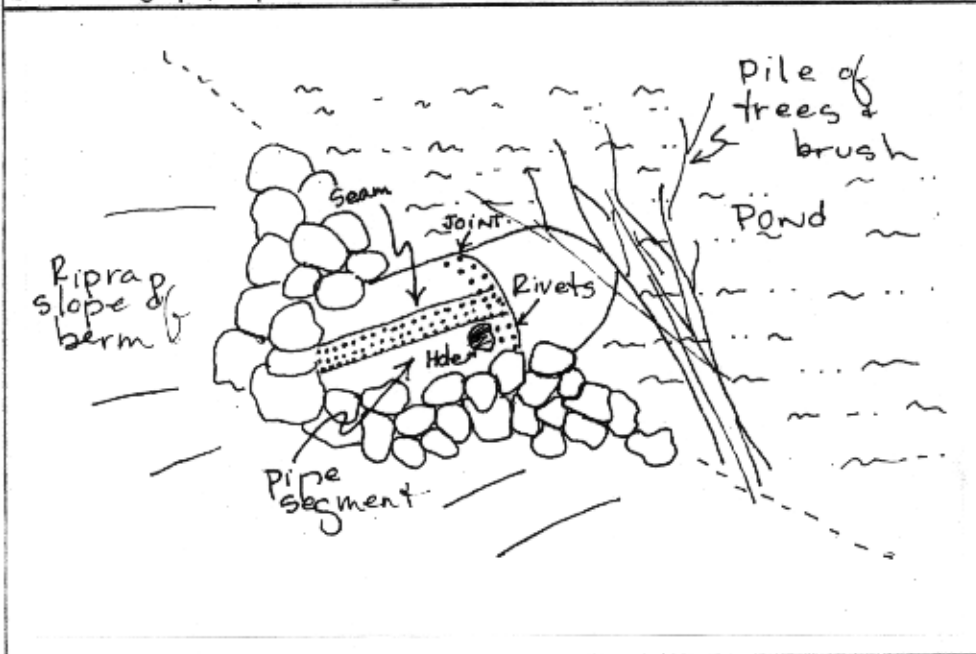
L6. Setting: (Describe natural features, landscape characteristics, slope, etc., as appropriate.)

The pipe segment is located in the lower reach of the Merced River in the actual channel. Riparian habitat exists on the river banks.

L7. Integrity Considerations:

Integrity is poor. The pipe is corroded and is heavily eroded.

L8a. Photograph, Map or Drawing



L8b. Description of Photo, Map, or Drawing (View, scale, etc.)

Drawing of pipe segment exposed in berm. No scale.

L9. Remarks:

Accompanied by Ron Wertham, DWR construction supervisor.

L10. Form Prepared by: (Name, affiliation, and address)

Robert Orlins
California Department of Water Resources, Environmental Services Office,
3251 S St., Sacramento, CA 95816

L11. Date: August 15, 2000

DPR 523E (1/95)

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

Primary #

HRI#

Trinomial

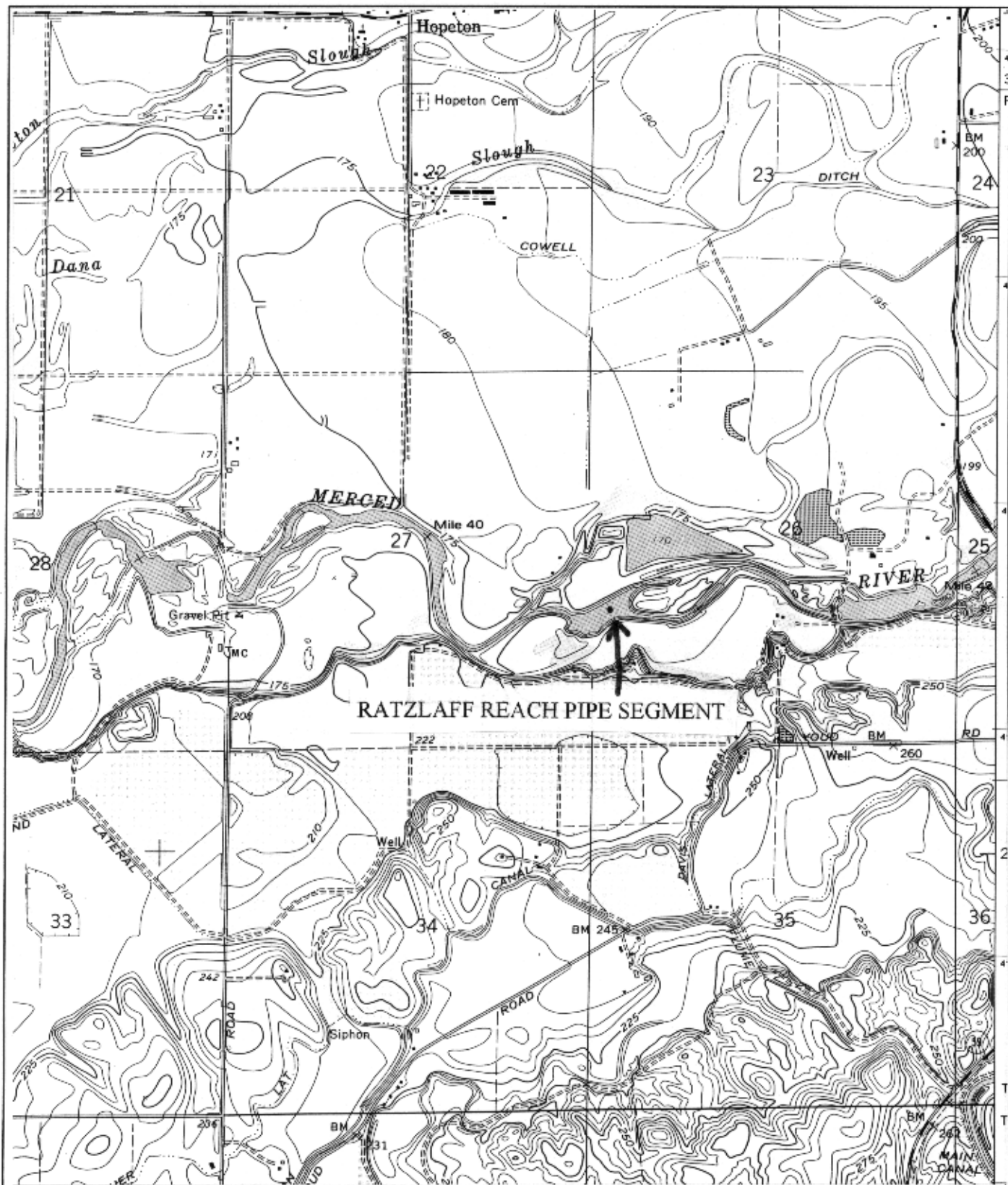
Page 3 of 3

*Resource Name or #: Ratzlaff Reach Pipe Segment

*Map Name: Winton (20ft Contour)

*Scale: 1:24,000

*Date of Map: 1987



APPENDIX H
FISH AND WILDLIFE SPECIES OBSERVED IN ROBINSON REACH DURING
BIOLOGICAL SURVEYS

	Scientific Name	Common Name
Mammals		
	<i>Peromyscus maniculatus</i>	Deer Mouse
	<i>Perognathus inornatus inornatus</i>	San Joaquin Pocket Mouse
	<i>Lasiurus blossevillii</i>	Red Bat
	<i>Tadarida brasiliensis</i>	Mexican Free-tailed Bat
	<i>Antrozous pallidus</i>	Pallid Bat
	<i>Eptesicus fuscus</i>	Big Brown Bat
	<i>Myotis yumanensis</i>	Yuma Myotis
	<i>Eumops perotis</i>	Western Mastiff Bat
	<i>Lasiurus cinereus</i>	Hoary Bat
	<i>Pipistrellus hesperus</i>	Western Pipistrelle
	<i>Myotis californicus</i>	California Myotis
	<i>Ondatra zibethicus</i>	Muskrat
	<i>Castor canadensis</i>	Beaver
	<i>Canis latrans</i>	Coyote
	<i>Odocoileus hemionus</i>	Mule Deer
	<i>Spermophilus beecyei</i>	California Ground Squirrel
Birds		
	<i>Botaurus lentiginosus</i>	American Bittern
	<i>Sterna forsteri</i>	Forester's Tern
	<i>Ardea herodias</i>	Great-blue Heron
	<i>Hirundo pyrrhonota</i>	Cliff Swallow
	<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow
	<i>Himantopus mexicanus</i>	Black-necked Stilt
	<i>Branta canadensis</i>	Canada Goose
	<i>Charadrius vociferus</i>	Killdeer
	<i>Casmerodius albus</i>	Great Egret
	<i>Elanus caeruleus</i>	White-tailed Kite
	<i>Plegadis chihi</i>	White-faced Ibis
	<i>Tachycineta bicolor</i>	Tree Swallow
	<i>Bubo virginianus</i>	Great-horned Owl
	<i>Buteo jamaicensis</i>	Red-tailed Hawk
	<i>Tringa sp.</i>	Greater or Lesser Yellowlegs
	<i>Tringa sp. or Calidris sp.</i>	Sandpiper
	<i>Ceryle alcyon</i>	Belted Kingfisher

Herps*Clemmys marmorata**Sceloporus occidentalis**Uta stansburiana**Rana catesbiana**Hyla regilla*

Western Pond Turtle

Western Fence Lizard

Sideblotch

Bullfrog

Pacific Treefrog

Fish*Micropterus salmoides**Gambusia sp.**Cyprinus carpio**Lepomis macrochirus**Procambarus sp.**Oncorhynchus tshawytscha*

Largemouth Bass

Mosquitofish

Carp

Bluegill

Crayfish

Fall-run Chinook salmon

APPENDIX I
PLANTS FOUND DURING SURVEYS IN ROBINSON REACH

Scientific name	Common name	Native/Introduced
ACERACEAE		
<i>Acer Macrophyllum</i>	Big-leaf Maple	Native
<i>Acer negundo var. californicum</i>	Box elder	Native
<i>Acer saccharinum</i>	Silver maple	Introduced
ALISMATACEAE		
<i>Alisma plantago-aquatica</i>	Water plantain	Native
<i>Sagittaria latifolia</i>	Arrowhead	Native
APIACEAE		
<i>Conium maculatum</i>	Poison hemlock	Introduced
ASTERACEAE		
<i>Ambrosia psilostachya</i>	Western ragweed	Native
<i>Anthemis cotula</i>	Mayweed	Introduced
<i>Artemisia douglasiana</i>	Mugwort	Native
<i>Bidens frondosa</i>	Sticktight	Native
<i>Bidens laevis</i>	Bur-marigold	Native
<i>Centaurea solstitialis</i>	Yellow star thistle	Introduced
<i>Cirsium vulgare</i>	Bull thistle	Introduced
<i>Conyza canadensis</i>	Horseweed	Native
<i>Filago californica</i>	Filago	Native
<i>Gnaphalium luteo-album</i>	Cudweed	Introduced
<i>Gnaphalium palustre</i>	Everlasting	Native
<i>Gnaphalium stramineum</i>	Cotton-batting plant	Native
<i>Grindelia camporum</i>	Gumplant	Native
<i>Helianthus annuus</i>	Sunflower	Native
<i>Hemizonia kelloggii</i>	Tarweed	Native
<i>Heterotheca grandiflora</i>	Telegraph weed	Native
<i>Heterotheca oregona var. rudis</i>		Native
<i>Lactuca serriola</i>	Prickly lettuce	Introduced
<i>Madia elegans ssp. densifolia</i>	Common madia	Native
<i>Picris echinoides</i>	Bristly ox-tongue	Introduced
<i>Silybum marianum</i>	Milk thistle	Introduced
<i>Xanthium spinosum</i>	Spiny cocklebur	Native
<i>Xanthium strumarium</i>	Cocklebur	Native
AZOLLACEAE		
<i>Azolla filiculoides</i>	Mosquito fern	Native

BETULACEAE		
<i>Alnus rhombifolia</i>	Alder	Native
BRASSICACEAE		
<i>Brassica nigra</i>	Black mustard	Introduced
<i>Raphanus raphanistrum</i>	Jointed charlock	Introduced
CALYCANTHACEAE		
<i>Calycanthus occidentalis</i>	Spicebush	Native
CAPRIFOLIACEAE		
<i>Sambucus mexicana</i>	Elderberry	Native
CARYOPHYLLACEAE		
<i>Herniaria hirsuta</i> ssp.	cinerea	Native
<i>Spergularia rubra</i>	Sand spurrey	Native
CHENOPODIACEAE		
<i>Atriplex patula</i>	Spear oracle	Native
<i>Chenopodium ambrosioides</i>	Mexican tea	Introduced
CYPERACEAE		
<i>Carex barbarae</i>	Santa Barbara sedge	Native
<i>Cyperus acuminatus</i>		Native
<i>Cyperus difformis</i>	Annual nutsedge	Introduced
<i>Cyperus eragrostis</i>	Umbrella sedge	Native
<i>Cyperus erythrorhizos</i>		Native
<i>Cyperus niger</i>		Native
<i>Cyperus strigosus</i>	False nutsedge	Native
<i>Eleocharis macrostachya</i>	Spikerush	Native
<i>Lipocarpus micrantha</i>		Native
<i>Scirpus acutus</i> var. <i>occidentalis</i>	Tule	Native
<i>Scirpus mucronatus</i>		Introduced
EQUISETACEAE		
<i>Equisetum arvense</i>	Common horsetail	Native
EUPHORBIACEAE		
<i>Chamaesyce maculata</i>	Spotted spurge	Introduced
<i>Eremocarpus setigerus</i>	Doveweed	Native
FABACEAE		
<i>Lotus purshianus</i> var. <i>purshianus</i>		Native
<i>Lupinus</i> sp.	Bush lupine	Native
<i>Melilotus alba</i>	White sweet clover	Introduced

FAGACEAE		
<i>Quercus douglasii</i>	Blue oak	Native
<i>Quercus lobata</i>	Valley oak	Native
GENTIANACEAE		
<i>Centaureum muhlenbergii</i>	Centaury	Native
GERANIACEAE		
<i>Erodium botrys</i>	Red-stemmed filaree	Introduced
HALORAGACEAE		
<i>Myriophyllum aquaticum</i>	Parrot's feather	Introduced
HIPPOCASTANACEAE		
<i>Aesculus californica</i>	California buckeye	Native
HYDROCHARITACEAE		
<i>Egeria densa</i>	Brazilian waterweed	Introduced
HYDROPHYLLACEAE		
<i>Eriodictyon californicum</i>	Yerba santa	Native
HYPERICACEAE		
<i>Hypericum anagalloides</i>	Tinker's penny	Native
<i>Hypericum perforatum</i>	Klamathweed	Introduced
IRIDACEAE		
<i>Iris sp.</i>	Iris	
JUGLANDACEAE		
<i>Juglans californica</i>	Black walnut	Native
JUNCACEAE		
<i>Juncus acuminatus</i>		Native
<i>Juncus balticus</i>		Native
<i>Juncus effusus</i> var. <i>pacificus</i>		Native
<i>Juncus xiphioides</i>	Iris-leaved rush	Native
LAMIACEAE		
<i>Lycopus americanus</i>	Bugleweed	Native
<i>Marrubium vulgare</i>	Horehound	Introduced
<i>Mentha arvensis</i>	Mint	Native
<i>Mentha pulegium</i>	Pennyroyal	Introduced
<i>Stachys albens</i>	Hedge nettle	Native

LEMNACEAE		
<i>Lemna sp.</i>	Duckweed	Native
LYTHRACEAE		
<i>Ammania robusta</i>		Native
<i>Lythrum hyssopifolium</i>	Loosestrife	Introduced
<i>Rotala ramosior</i>		Native
MOLLUGINACEAE		
<i>Mullugo verticillata</i>	Carpet weed	Introduced
MORACEAE		
<i>Ficus carica</i>	Edible fig	Introduced
<i>Morus alba</i>	White mulberry	Introduced
ONAGRACEAE		
<i>Epilobium brachycarpum</i>		Native
<i>Epilobium ciliatum ssp. ciliatum</i>	Willow herb	Native
<i>Epilobium densiflorum</i>	Fireweed	Native
<i>Ludwigia palustris</i>	False loosestrife	Native
<i>Ludwigia peploides ssp. peploides</i>	Water primrose	Native
PAPAVERACEAE		
<i>Eschscholzia caespitosa</i>	Poppy	Native
<i>Eschscholzia californica</i>	California poppy	Native
PINACEAE		
<i>Pinus sabiniana</i>	Gray pine	Native
PHYTOLACCACEAE		
<i>Phytolacca americana</i>	Pokeweed	Introduced
PLATANACEAE		
<i>Platanus acerifolia</i>	London plane tree	Introduced
POACEAE		
<i>Agrotis viridis</i>	Bent grass	Introduced
<i>Avena barbata</i>	Slender wild oat	Introduced
<i>Avena fatua</i>	Wild oat	Introduced
<i>Bromus diandrus</i>	Ripgut brome	Introduced
<i>Bromus madritensis ssp. rubens</i>	Red brome	Introduced
<i>Bromus mollis</i>	Soft chess	Introduced
<i>Cynodon dactylon</i>	Bermuda grass	Introduced
<i>Digitaria sanguinalis</i>		Introduced
<i>Echinochloa crus-galli</i>	Barnyard grass	Introduced
<i>Leersia oryzoides</i>	Rice cutgrass	Native

<i>Leymus triticoides</i>	Alkali rye	Native
<i>Lolium multiflorum</i>	Italian rye grass	Introduced
<i>Nassella</i> sp.	Needlegrass	Native
<i>Paspalum dilatatum</i>	Dallis grass	Introduced
<i>Paspalum notatum</i>		Introduced
<i>Poa annua</i>	Annual blue grass	Introduced
<i>Polypogon monspeliensis</i>	Annual beard grass	Introduced
<i>Setaria viridis</i>		Introduced
<i>Sorghum halepense</i>	Sorghum	Introduced
POLYGONACEAE		
<i>Polygonum hydropiperoides</i>	Water pepper	Native
<i>Polygonum lapathifolium</i>	Willow weed	Native
<i>Rumex crispus</i>	Curly dock	Introduced
PONTADERIACEAE		
<i>Eichhornia crassipes</i>	Water hyacinth	Introduced
POTAMOGETONACEAE		
<i>Potamogeton crispus</i>	Crispate-leaved pondweed	Introduced
RHAMNACEAE		
<i>Rhamnus tomentella</i> ssp. <i>tomentella</i>	Hoary coffeeberry	Native
ROSACEAE		
<i>Rubus discolor</i>	Himalayan blackberry	Introduced
<i>Rubus ursinus</i>	California blackberry	Native
RUBIACEAE		
<i>Cephalanthus occidentalis</i>	Button bush	Native
SALICACEAE		
<i>Populus fremontii</i>	Fremont cottonwood	Native
<i>Populus nigra</i> var. <i>italiana</i>	Lombardy poplar	Introduced
<i>Salix exigua</i>	Narrow-leaved willow	Native
<i>Salix gooddingii</i>	Goodding's black willow	Native
<i>Salix laevigata</i>	Red willow	Native
<i>Salix lasiolepis</i>	Arroyo willow	Native
SCROPHULARIACEAE		
<i>Kickxia elatine</i>	Fluellin	Introduced
<i>Lindernia dubia</i> var. <i>anagallidea</i>	False pimpernel	Native
<i>Mimulus cardinalis</i>	Scarlet monkeyflower	Native
<i>Mimulus floribundus</i>		Native
<i>Mimulus guttatus</i>	Annual monkey flower	Native
<i>Verbascum blattaria</i>	Moth mullein	Introduced

<i>Verbascum thapsus</i>	Woolly mullein	Introduced
<i>Veronica catenata</i>	Chain speedwell	Introduced
SOLANACEAE		
<i>Datura sp.</i>	Jimson weed	Native
<i>Nicotiana glauca</i>	Tree tobacco	Introduced
<i>Nicotiana sp</i>	Ground cherry	Introduced
<i>Solanum americanum</i>	Nightshade	Native
TYPHACEAE		
<i>Typha angustifolia</i>	Narrow-leaved cattail	Native
<i>Typha latifolia</i>	Broad-leaved cattail	Native
URTICACEAE		
<i>Urtica dioica</i>	Giant nettle	Native
VERBENACEAE		
<i>Phyla nodiflora var. nodiflora</i>		Native
<i>Verbena sp.</i>		
VITACEAE		
<i>Vitis californica</i>	Wild grape	Native

MERCED RIVER SALMON HABITAT ENHANCEMENT PROJECT
ROBINSON REACH

Appendix J. Associated Avoidance and Conservation Measures

Code	Avoidance and Conservation Measures
	Vegetation and Wildlife
VW1	All activities will be implemented in coordination with protection, avoidance, and/or minimal impacts of existing habitats.
VW2	All activities will be implemented during the least detrimental time of year; e.g., low streamflow periods.
VW3	All activities will be completed in a timely manner.
VW4	All contractors and equipment operators will be given written and oral instructions to avoid impacts and be made aware of ecological values of the site.
VW5	Pre-construction field surveys will be conducted during suitable seasons by qualified personnel to identify any sensitive plants or sensitive areas (such as wetlands, riparian zones, native habitat, vernal pools, and special status species habitat) at or near the project site. If pre-construction surveys should identify sensitive habitats, those areas will be flagged, isolated, and avoided during the construction process.
VW6	Pre-construction field surveys will be conducted by qualified personnel to confirm that no sensitive terrestrial wildlife, such as special status species and migratory birds, occur within a distance where they could be adversely affected.
VW7	A biological monitor will be available on site when needed. The monitor will check the site before construction for sensitive wildlife; assist in avoiding impacts to fish, wildlife, and habitats; determine the least damaging options for removal or transplantation of vegetation according to established protocols; and provide technical information.
VW8	Existing access points will be used whenever possible in order to avoid sensitive locations.
VW9	Least sensitive areas will be used for parking, construction activities, stockpiling, and staging areas, and these areas will be clearly marked and restored following construction.
VW10	Unavoidable damage to wildlife habitat will be mitigated according to the Service's Mitigation Policy.

Code	Avoidance and Conservation Measures
VW11	Disturbed sites will be revegetated. All planted vegetation will be with species native to, and collected in, the area, as appropriate.
VW12	When feasible, native vegetation will be salvaged from areas where ground disturbances occur, and replanted.
VW13	Vegetative planting techniques will not cause major disturbances to soils and slopes.
VW14	Fast growing willows, alders, and others species will be planted at stream edges, as appropriate, to minimize recovery time and provide shade to near-shore portions of the stream.
VW15	Excavating, filling, and other earth moving will be done in a gradual manner to allow wildlife species to escape in advance of machinery and moving materials.
VW16	Topsoil removed for excavations will be retained, stockpiled, and re-spread.
VW17	Surveying and monitoring activities will be designed and conducted to minimize disturbance of wildlife and their habitat.
VW18	Environmental protections at borrow sites will be the same as at project construction sites.
VW19	Riparian vegetation adversely affected by altered hydrology will be mitigated.
	Fisheries and Water Quality
FWQ1	Construction activities will be timed to occur when juvenile and adult life stages are most scarce, in-migration and out-migration are at their lowest points, and spawning and incubation are not occurring. Construction activities will occur only between June 1 and October 31. Limiting construction activities to this period will reduce potential adverse impacts to spawning adults and incubating eggs, fry and juveniles.
FWQ2	To greatest extent possible, in channel construction activities shall be isolated from free flowing waters of the Merced River. Flows shall be diverted to temporary channels prior to construction of newly restored channels. Flows will be gradually diverted to temporary channels, over a 24 hour period, to allow salmonids adequate time to voluntarily leave the active channel. Once flows have been fully diverted from the active channel, fish rescue operations shall immediately be conducted by qualified fishery biologists. All fish collected during the fish rescue shall be released unharmed downstream of the project area construction or at a location determined by the NMFS or CDFG.

Code	Avoidance and Conservation Measures
FWQ3	Uncrushed cleaned gravel (½” to 5”) shall be used to construct necessary stream crossings. Following construction these gravels shall be leveled and left instream to improve spawning habitat for anadromous salmonids.
FWQ4	Adequate fish passage conditions shall be maintained through the project area during implementation of rehabilitation activities
FWQ5	Construction of all rehabilitation actions shall comply with Regional Water Quality Control Board Basin Plan Objectives and a Water Pollution Prevention Plan and standard BMPs would be obtained and incorporated into the project description. Compliance with water quality objectives and implementation of BMPs will further reduce the potential to impact salmonids during project implementation.
FWQ6	If cofferdams are used, only screened pumps will be used to de-water the construction area. The channel will be rewatered incrementally to minimize turbidity and sedimentation.
FWQ7	Instream construction activities must be minimized to reduce sedimentation. Avoid construction during the rainy season or high flows to the degree possible.
FWQ8	Silt curtains, silt fences, settling basins, sandbags, check-dams, straw bales, and other erosion control devices to will be used as necessary to minimize sediment impacts to waters. Turbidity will be monitored to meet accedence thresholds established by project’s water quality waiver agreement with the Regional Water Quality Control Board, as applicable.
FWQ9	Any machinery that enters the river during work will be steam-cleaned and properly maintained to avoid water quality contamination from the release of grease, oil, petroleum products, or other nonnative materials.
FWQ 10	Only clean gravel, washed of silt and fines will be placed into streams. Rewatering the stream channel after construction will be done incrementally to avoid mobilization of sediments and increases in turbidity.
FWQ 11	Surveying and monitoring activities will be designed and conducted to minimize disturbance of fish habitat. Should the collection of data on redds require surveyor boats, monitors will travel only downstream to minimize disturbance of salmon redds.

Code	Avoidance and Conservation Measures
SS1	<p>Special Status Species</p> <p><i>Mammals</i></p> <p><u>San Joaquin kit fox (<i>Vulpes macrotis mutica</i>) (E)</u></p> <p>Habitat associations and areas that should be surveyed and/or avoided: San Joaquin valley floor saltbush scrub, valley sink scrub, valley and foothill grasslands, and agricultural lands adjacent to the above associations. Den site requirements for shelter and reproduction, found in areas with friable soils, in hard clay soils, and are created by enlarging holes started by ground squirrels or badgers. Also, known to utilize certain man-made structures, such as culverts, pipes, and rubble piles. Dens occur in flat terrain, hills, and roadside berms.</p> <p>Before staging and construction, have a Service-approved biologist survey for dens and other kit fox sign, such as scat, prey remains, and tracks. The biologist shall follow the Service's Standard Recommendations For Avoidance of The San Joaquin Kit Fox (1997). If any evidence of kit fox activity is found, contact the Service's Sacramento Fish and Wildlife Office to initiate consultation. A Service-approved worker awareness program shall be conducted for all projects located in areas that provide, or may provide, habitat for this species.</p> <p>Confine surface disturbance to areas that do not exhibit the habitat types and sign with an adequate buffer (not less than 200 feet). The biologist must stake and flag to exclude construction activities within 200 feet of potential habitat. To avoid inadvertent entrapment of animals in holes during construction, all excavated, steep-walled holes or trenches more than 2 feet deep should be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks.</p> <p>All construction pipes, culverts, or similar structures with a diameter of 4 inches or greater that are stored at a construction site for one or more overnight periods should be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way.</p> <p>No work shall be conducted between sunset and sunrise within one-half mile of potential habitat. No domestic animals (pets) shall be allowed on the project site. On unposted roads vehicle speeds shall not exceed 25 miles per hour. Trash shall be disposed of in covered containers and removed daily. Restrict the use of rodenticides and herbicides to prevent secondary poisoning. In the event that take cannot be avoided, contact the Service for information prior to starting the action.</p>
SS2	<p><u>Merced kangaroo rat (<i>Dipodomys heermanni dixonii</i>) (SC)</u></p> <p>Habitat associations and areas that should be surveyed and/or avoided: Annual grasslands, chenopod scrub, and mixed montane chaparral, and early successional stages (sparse to open canopy) of San Joaquin Valley foothill hardwood and valley</p>

Code	Avoidance and Conservation Measures
	<p>foothill hardwood conifer habitats. Prefer fine, deep, friable soils.</p> <p>Before any ground disturbing activities, have a Serviced-approved biologist survey for the presence of the plant associations considered habitat. The Service-approved biologist must survey for the presence of Merced kangaroo rat sign, such as burrow systems, haystacks, and areas of clipped vegetation. A Service-approved worker awareness program shall be conducted for all projects located in areas that provide, or may provide, habitat for this species.</p> <p>Confine surface disturbance to areas that do not exhibit the signs listed above with an adequate buffer (not less than 200 feet). The biologist must stake and flag to exclude construction activities within 200 feet of potential habitat. No work shall be conducted between sunset and sunrise within one-half mile of potential habitat. No domestic animals (pets) shall be allowed on the project site. On unposted roads vehicle speeds shall not exceed 25 miles per hour. Trash shall be disposed of in covered containers. In the event that take cannot be avoided, contact the Service for information prior to starting the action.</p>
SS3	<p><u>San Joaquin pocket mouse (<i>Perognathus inornatus</i>) (SC)</u></p> <p>Habitat associations and areas that should be surveyed and/or avoided: Dry, open grasslands or scrub areas on fine-textured soils in the San Joaquin Valley foothills. Avoidance and conservation measures similar to the Merced kangaroo rat should be followed.</p>
SS4	<p><u>Riparian Brush Rabbit (<i>Sylvilagus bachmani riparius</i>) (E)</u> and <u>Riparian Woodrat (<i>Neotoma fuscipes riparia</i>) (E)</u></p> <p>Habitat associations and areas that should be surveyed and/or avoided: Riparian brush rabbits were historically found in riparian forest and shrubland communities along the lower portions of the San Joaquin and Stanislaus rivers in the northern San Joaquin Valley. Currently the only known population is in Caswell Memorial State Park in San Joaquin County. Counties with suitable habitat where this species may occur are Merced, Stanislaus, and San Joaquin. Preferred habitat of the riparian brush rabbit is where there is a dense understory shrub layer consisting of wild rose, blackberries, wild grape, coyote bush and grasses and very few willows in the understory and canopy.</p> <p>Before any ground disturbing activities, have a Service-approved biologist survey for the presence of the plant associations considered habitat for the riparian brush rabbit and riparian woodrat. A Service-approved worker awareness program shall be conducted for all projects located in areas that provide, or may provide, habitat for these species.</p> <p>Confine surface disturbance to areas that do not exhibit the signs listed above with an adequate buffer (not less than 200 feet). The biologist must stake and flag to exclude</p>

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	<p>construction activities within 200 feet of potential habitat. No work shall be conducted between sunset and sunrise within one-half mile of potential habitat. No firearms shall be allowed on the project site. Avoid shooting any rabbit that might be thought to be legal game. No domestic animals (pets) shall be allowed on the project site. On unposted roads vehicle speeds shall not exceed 25 miles per hour. Trash shall be disposed of in covered containers and removed daily. In the event that take cannot be avoided, contact the Service for information prior to starting the action.</p>
SS5	<p><u>Pacific western big-eared bat (<i>Corynorhinus (=Plecotus) townsendii townsendii</i>)</u> (SC) Preferred habitat includes mesic brushy, woodland, and forest. Roost in buildings, caves, mines, and tunnels.</p>
SS6	<p><u>Greater western mastiff-bat (<i>Eumops perotis californicus</i>)</u> (SC) Preferred habitat includes semi-arid wooded, chaparral, scrub, and perennial grasslands. Roost in buildings, cliff faces, tunnels, and trees.</p>
SS7	<p><u>Small-footed myotis bat (<i>Myotis ciliolabrum</i>)</u> (SC) Preferred habitat includes arid wooded and brushy uplands near water. Roost in buildings, caves, crevices, and occasionally under bridges and spaces under bark.</p>
SS8	<p><u>Long-eared myotis bat (<i>Myotis evotis</i>)</u> (SC) Preferred habitat includes brushy, woodland, and forest. Roost in buildings, caves, crevices, spaces under bark, and snags.</p>
SS9	<p><u>Fringed myotis bat (<i>Myotis thysanodes</i>)</u> (SC) Preferred habitat includes pinyon-juniper, valley foothill hardwood and hardwood-conifer. Roosts in buildings, caves, crevices.</p>
SS10	<p><u>Long-legged myotis bat (<i>Myotis volans</i>)</u> (SC) Preferred habitat includes brushy, woodland, and in early successional stages of woodlands and forests. Roosts in buildings, caves, rock crevices, spaces under bark, and snags.</p>
SS11	<p><u>Yuma myotis bat (<i>Myotis yumanensis</i>)</u> (SC) Preferred habitat includes open forest and woodlands with permanent source of water. Roost in buildings, mines, caves, or crevices, occasionally found roosting in abandoned swallow nests under bridges (DFG 1990).</p> <p>Before any ground disturbing activities, have a Service-approved biologist survey for the presence of associated habitat types for the bat species of concern. A Service-approved worker awareness program shall be conducted for all projects located in areas that provide, or may provide, habitat for these species. If bats are present, suitable avoidance and conservation measures should be implemented. Avoid disturbance of roosts in May, June, and July during late pregnancy and while young</p>

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SS13	<p>are non-volant.</p> <p><i>Birds</i></p> <p><u>Aleutian Canada goose (<i>Branta canadensis leucopareia</i>) (T)</u> Habitat associations and areas that should be surveyed and/or avoided: Agricultural lands (crop and pasture) along the north coast of California, and throughout California's Central Valley. Aleutian geese are seasonally common between October 1 and May 15.</p> <p>Do not convert agricultural lands to other uses in the high-use areas identified above for Aleutian Canada geese. Any proposed conversion of agricultural land requires formal consultation. To the extent practicable, restrict construction activities in areas used for Aleutian Canada goose wintering habitat to the period between May 15 and September 30. To the extent practicable, avoid disturbing flocks of foraging geese during peak goose foraging times: the first and last two hours of daylight. In the event that take cannot be avoided, contact the Service for information prior to starting the action.</p>
SS14	<p><u>Bald eagle (<i>Haliaeetus leucocephalus</i>) (T)</u> Habitat associations and areas that should be surveyed and/or avoided: Nests in uneven-aged (multi-storied) stands of mixed conifers near bodies of water (Nest trees in CA are typically mature, large ponderosa or sugar pines between 41 to 46 inches in diameter). Surveys should be conducted in any suitable nesting habitat. If nest surveys are conducted, begin after mid-April. If there are any bald eagle nests within 0.5 miles with a direct line of sight to the activity, implement a seasonal restriction on project activities that could disturb nesting. Construction activities must not occur within 0.5 miles of a nest site from January 1 through August 31 and/or within 0.5 miles of a roost site from November 15 through March 15.</p> <p>Avoid removing large, mature trees or snags over 20" diameter at breast height (DBH) along watercourses, lakes or reservoirs. Maintain and protect local fish populations from sedimentation and other habitat disturbance. In the event that take cannot be avoided, contact the Service for information prior to starting the action.</p>
SS14	<p><u>Mountain plover (<i>Charadrius montanus</i>) (PT)</u> Habitat associations in California and areas that should be surveyed and/or avoided: Between November and March in the Central Valley south of Sacramento and west of U.S. Highway 99, and in the Imperial Valley in southern California in shortgrass and shrub-steppe landscapes, and associated with grazing and burrowing mammal communities. Preferred habitats include noncultivated alkali sink scrub, valley sink scrub, alkali playas, and burned and/or moderately grazed annual grasslands, but they may also be found in agricultural fields.</p>

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SS15	<p>If suitable habitat is found within the project area, and surveys indicate species presence, project activities should halt until the Service is contacted for further consultation.</p> <p><u>Ferruginous hawk (<i>Buteo regalis</i>) (SC)</u> Habitat associations in California and areas that should be surveyed and/or avoided: Winter resident and migrant to open grasslands, agricultural lands, sagebrush flats, desert scrub, low foothills surrounding the valley, and fringes on pinyon-juniper habitats. nest in the large trees of the lowlands of the Central Valley such as oaks, cottonwoods and walnuts. Roost in open areas, usually in a lone tree or utility pole. Not known to nest in California.</p> <p>Site surveys will be conducted to identify suitable foraging and roosting habitat and species presence. If located within 0.5 mile of the project site with a direct line of sight to the activity, the Service and/or the CDFG will be consulted to establish appropriate mitigation. Seasonal restrictions on project activities may be appropriate.</p>
SS16	<p><u>Tricolored blackbird (<i>Agelaius tricolor</i>) (SC)</u> Habitat associations and areas that should be surveyed and/or avoided: Breeds/Nests near fresh water, preferably emergent marsh with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, and tall herbs. Nesting may occur between late March and late July. Fledging occurs approximately 45 days from hatch. Forages in grassland and cropland habitats.</p> <p>Site surveys will be conducted to identify suitable nesting habitat and species presence. If located nesting within project area, the Service and/or CDFG will be consulted to establish appropriate mitigation. Seasonal restrictions on project activities may be appropriate.</p>
SS17	<p><u>Bell's sage sparrow (<i>Amphispiza belli belli</i>) (SC)</u> Habitat associations and areas that should be surveyed and/or avoided: Low, dense stands of shrubs, sagebrush, alkali desert scrub, desert scrub, and similar habitats. Breeds from late March to mid-August. Territory size approximately 50 square yards.</p> <p>Site surveys will be conducted to identify suitable nesting habitat and species presence. If located nesting within project area, the Service and/or CDFG will be consulted to establish appropriate mitigation. Seasonal restrictions on project activities may be appropriate.</p>
SS18	<p><u>Western burrowing owl (<i>Athene cunicularia hypugea</i>) (SC)</u> Habitat associations and areas that should be surveyed and/or avoided: Annual and perennial grasslands, deserts, and arid scrublands characterized by low-growing vegetation. Suitable habitat may also include trees and shrubs if the canopy covers</p>

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SS19	<p>less than 30 percent of the ground surface. Burrows are the essential component of burrowing owl habitat. Both natural and artificial burrows provide protection, shelter, and nests. Burrowing owls typically use burrows made by fossorial mammals, such as ground squirrels or badgers, but also may use man-made structures such as cement culverts, asphalt, or wood debris piles; or openings beneath cement or asphalt pavement. Burrowing owls may use a site for breeding, wintering, foraging, and/or migration stopovers.</p> <p>Site surveys will be conducted to identify suitable habitat and species occupancy. Occupancy of suitable habitat can be verified at a site by detecting a burrowing owl, its molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance. Burrowing owls exhibit site fidelity, reusing burrows year after year. A site should be assumed occupied if at least one burrowing owl has been observed occupying a burrow there within the last three years (CDFG BOWM 1995). If presence is determined, CDFG should be contacted for the appropriate mitigation measures to minimize impacts to burrowing owls, their burrows and foraging habitat.</p> <p><u>Little willow flycatcher (<i>Empidonax traillii brewsteri</i>) (CA)</u> Habitat associations and areas that should be surveyed and/or avoided: Summer resident (May to August) to riparian habitats along rivers, streams, or other wetlands, where dense growths of willows in the foothills and mountains of the Central Valley. Roosts and nests in lush shrubby willow thickets. Territories sizes vary from approximately 0.8 to 2.9 acres.</p> <p>Site surveys will be conducted to identify suitable nesting habitat and species presence. If located nesting within project area, the Service and/or CDFG will be consulted to establish appropriate mitigation. Seasonal restrictions on project activities may be appropriate.</p>
	<p><u>White-faced ibis (<i>Plegadis chihi</i>) (SC)</u> Habitat associations and areas that should be surveyed and/or avoided: Distant and local migrant. Prefers fresh emergent wetland, shallow lacustrine waters, and muddy ground of wet meadows and irrigated, or flooded pastures and croplands. Nests in dense, fresh emergent wetland.</p> <p>Site surveys will be conducted to identify suitable nesting habitat and species presence. If located nesting within project area, the Service and/or CDFG will be consulted to establish appropriate mitigation. Seasonal restrictions on project activities may be appropriate.</p>

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SS21	<p><i>Amphibians</i></p> <p><u>California red-legged frog (<i>Rana aurora draytonii</i>)</u></p> <p>Habitat associations and areas that should be surveyed and/or avoided: Creeks, ponds and marshes, often with cattails, tules, and willows and uplands adjacent to wetland habitats. If habitat is present, a red-legged frog survey will be conducted at least six months before construction begins. Before construction, work crews will review one-page guidance on identifying red-legged frogs and bullfrogs, and will be instructed to be observant for frogs at project sites. All ponds or reaches of creeks where cattails or tules grow will be avoided. All stands of willows will be fenced to prevent intrusion by workers or machinery. Placement of gravel or other materials into red-legged frog habitat will be done gradually from the water's edge out into the stream or pond to allow frogs to escape. If red-legged frogs are found and habitat may be affected, consultation with the service will be required.</p> <p>During project activities, all trash that may attract predators shall be properly contained, removed from the work site and disposed of regularly. Following construction, all trash and construction debris shall be removed from work areas. All fueling and maintenance of vehicles and other equipment and staging areas shall occur at least 20 meters from any riparian habitat or water body. All workers shall be informed of the importance of preventing spills and of the appropriate measures to take should a spill occur.</p> <p>Work activities should be completed between April 1 and November 1. Best management practices to control erosion during and after project implementation shall be implemented. If a work site is to be temporarily dewatered by pumping, intakes shall be completely screened with wire mesh not larger than five millimeters (mm) to prevent California red-legged frogs from entering the pump system. Water shall be released or pumped downstream at an appropriate rate to maintain downstream flows during construction. Upon completion of construction activities, any barriers to flow shall be removed in a manner that will allow flow to resume with the least disturbance to the substrate.</p>
SS22	<p><u>California Tiger Salamander (<i>Ambystoma californiense</i>)</u></p> <p>California tiger salamanders are restricted to grasslands and low (under 1500 foot) foothill regions where lowland vernal pools, vernal playas and large sag ponds sites are available for breeding. They require areas with refugia provided by ground squirrels and other burrowing mammals in which to estivate during the dry months, and large contiguous areas of vernal pools (vernal pool complexes or comparable aquatic breeding habitat) containing multiple breeding ponds to ensure that recolonization occurs at individual pond sites.</p> <p>The project area lies within the active river corridor and does not likely contain vernal pool habitat. Any marginal habitats present contain large populations of bullfrogs</p>

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SS23	<p>and largemouth bass which severely reduces the potential for viable populations of California tiger salamanders. The project area will be surveyed for potential habitat and species presence. If they are found within the project area the Service will be contacted for further consultation and avoidance measures.</p> <p><i>Reptiles</i></p> <p><u>Blunt-nosed leopard lizard (<i>Gambelia sila</i>)</u></p> <p>Habitat associations and areas that should be surveyed and/or avoided: Open areas with sparse vegetation in valley and foothill grasslands, saltbush scrub, alkali flats, large washes, and canyon floors. Abandoned badger dens and the burrows of squirrels, gophers, or kangaroo rats because the lizard lives within these dens or burrows. Adults prefer shallow burrows, while foraging immature leopard lizards shelter under rock piles or brush.</p> <p>Before staging and construction, have a Service-approved biologist survey for the presence of the habitat types used by this species and signs of leopard lizards, such as burrows. The protocol developed by the California Department of Fish and Game shall be used to survey for this species. During the blunt-nosed leopard lizard's hibernation time, surveys are unreliable and cannot be used to determine absence of this species. Notice will be given to the California Department of Fish and Game and the Service 30 days prior to beginning construction to determine if capture is desired.</p> <p>For projects from 5 to 10 acres in size (or 5 to 10 linear miles), surface disturbance will be scheduled during the active season (approximately April 15 to October 15). Any trenches will be surveyed in the morning and late afternoon to remove lizards that fall into the trench by a Service-approved biologist. A Service-approved worker awareness program shall be conducted for all projects located in areas that provide, or may provide, habitat for this species.</p> <p>Confine surface disturbance to areas that do not exhibit the habitat types and sign listed above with an adequate buffer (not less than 200 feet). The biologist must stake and flag to exclude construction activities within 200 feet of potential habitat. No work shall be conducted between sunset and sunrise within one-half mile of potential habitat. No domestic animals (pets) shall be allowed on the project site. On unposted roads vehicle speeds shall not exceed 25 miles per hour. Trash shall be disposed of in covered containers and removed daily. In the event that take cannot be avoided, contact the Service for information prior to starting the action.</p>
SS24	<p><u>Giant garter snake (<i>Thamnophis gigas</i>)</u></p> <p>Habitat associations and areas that should be surveyed and/or avoided: Permanently aquatic habitat or habitats seasonally flooded during the snakes active season (early-spring through mid-fall), such as marshes, sloughs, ponds, low gradient streams,</p>

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SS25	<p>irrigation and drainage canals, and rice fields. If habitat is present, a giant garter snake survey will be conducted at least six months before construction begins. If giant garter snakes are found or their habitat may be affected, consultation with the service will be required.</p> <p>Construction activity within giant garter snake habitat will be limited to May 1 through October 1, when the snakes are usually active. Other construction times would require additional guidance from the Service to determine if additional measures are necessary, as giant garter snakes are more susceptible to take when occupying underground burrows or crevices. The project will be surveyed for the snake 24-hours prior to construction activities, and any sightings reported to the Service. Survey of the project area will be repeated if a lapse in construction activity of two weeks or greater has occurred. Construction personnel will receive Service-approved worker awareness training to instruct workers to recognize the snake and its habitat.</p> <p>Giant garter snake habitat within and adjacent to construction sites will be flagged as environmentally sensitive areas. Movement of heavy equipment to and from project sites, staging areas, or borrow sites will be confined to existing roadways to minimize habitat disturbance. Equipment and construction activities will keep at least 200 feet from giant garter snake aquatic habitat to avoid impacts. If construction activities must occur less than 200 feet from habitat, the effected area will be confined to the minimum necessary for construction activities. A Service-approved biologist will be on site during clearing and grubbing of wetland vegetation. Any dewatered habitat will remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat. If a snake is encountered during construction, activities will stop until it successfully escapes the project area or until capture and relocation have been completed by a Service-approved biologist. Disturbed areas will be returned to pre-project conditions following construction.</p> <p><i>Fish</i></p> <p>Central Valley fall-run/late fall chinook salmon critical habitat; Central Valley fall-run chinook salmon (<i>O. tshawytscha</i>); Central Valley steelhead (<i>Oncorhynchus mykiss</i>):</p> <p>Construction activities will be timed to occur when juvenile and adult life stages are most scarce, in-migration and out-migration are at their lowest points, and spawning and incubation are not occurring. Construction activities occurring between July and September are likely to avoid direct effects to the greatest extent possible. Any new diversions will be screened per CDFG and NMFS criteria. General measures listed for Fisheries and Water Quality and Hydrology and Stream Channel will also contribute to avoidance and minimization of adverse effects, such as sedimentation, to special status salmonids.</p>

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SS26	<p>On February 16, 2000, the National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce designated Critical Habitat for Evolutionarily Significant Units of Salmon and Steelhead in Washington, Oregon, Idaho, and California in the Final rule 50 CFR Part 226. The NMFS included the adjacent riparian zone as part of critical habitat and defined it in the regulation as those areas within a horizontal distance of 300 feet (91.4 meters) from the normal high water line. Riparian vegetation providing shaded riverine aquatic habitat will be protected during construction and will be mitigated if damage is unavoidable. The project description and revegetation plan should consider a 300 foot riparian zone and incorporate the appropriate avoidance, conservation and mitigation measures.</p> <p><i>Invertebrates</i></p> <p><u>Valley elderberry longhorn beetle (<i>Desmocerus californicus dimorphus</i>)</u></p> <p>Habitat associations and areas that should be surveyed and/or avoided: Elderberry plants (<i>Sambucus</i> spp.) in riparian habitats, although any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level are considered habitat. Surveys will be conducted on project sites at least six months before construction activities to locate elderberry plants.</p> <p>Elderberry plants will be avoided if possible. If elderberry plants cannot be avoided consultation with the Service will be required. An incidental take permit from the Service will be necessary to remove or transplant Elderberry plants. Transplanting of elderberry plants will follow 1999 protocols and will be included in the revegetation plan. During construction bright orange construction fencing or similar material will temporarily fence plants so they are not disturbed. The fence will run at least 20 feet (core avoidance) from the dripline of any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level. Core avoidance areas should not be disturbed during or after construction or during operation of the project. Buffer avoidance area includes all area within 100 feet of any elderberry plant with a stem measuring 1.0 inch or greater in diameter at ground level. Firebreaks may not be included in the buffer zone.</p> <p>Brief contractors on the need to avoid damaging the elderberry plants and the possible penalties for not complying with these requirements. Instruct work crews about the status of the beetle and the need to protect its elderberry host plant. Erect signs every 50 feet along the edge of the avoidance area with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet, and must be maintained for the</p>

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SS27	<p>duration of construction.</p> <p>Restore any damage done to the buffer area (area within 100 feet of elderberry plants) during construction. Provide erosion control and re-vegetate with appropriate native plants. Measures such as fencing, signs, weeding, and trash removal are usually appropriate. No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant should be used in the core and buffer avoidance areas, or within 100 feet of any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level. Mowing of grasses/ground cover may occur from July through April to reduce fire hazard. No mowing should occur within five (5) feet of elderberry shrub stems. Mowing must be done in a manner that avoids damaging shrubs (e.g., stripping away bark through careless use of mowing/trimming equipment). In the event that take cannot be avoided, contact the Service for information prior to starting the action.</p> <p><u>Conervancy fairy shrimp (<i>Branchinecta conservatio</i>) (E)</u> <u>vernal pool fairy shrimp (<i>Branchinecta lynchi</i>) (T)</u> <u>vernal pool tadpole shrimp (<i>Lepedurus packardi</i>) (E)</u></p> <p>These species may be found in vernal pools and other seasonal wetlands that pond water for three weeks or more are potential habitat for these vernal pool plants. A survey should be conducted to look for vegetation and hydrologic indicators typical of such wetlands. In some instances vernal swales can support these species. Before any ground disturbing activities, have a Service-approved botanist survey for the presence of the soils and plant associations considered habitat for these species.</p> <p>Stay at least 250 feet from the margin of the pool/swale edge. When conducting activities beyond 250 feet from habitat, be careful to avoid activities which will eventually result in effects to the pool/swale through changes in hydrology, sedimentation, or contamination of the habitat.</p> <p>Adequate fencing will be placed and maintained around any avoided (preserved) vernal pool habitat to prevent impacts from vehicles. If habitat is avoided (preserved) on site, then a Service-approved biologist (monitor) will inspect any construction-related activities at the proposed project site to ensure that no unnecessary take of listed species or destruction of their habitat occurs. The biologist will have the authority to stop all activities that may result in such take or destruction until appropriate corrective measures have been completed. The biologist also will be required to report immediately any unauthorized impacts to the Service and the California Department of Fish and Game.</p> <p>All on-site construction personnel will receive instruction regarding the presence of listed species and the importance of avoiding impacts to these species and their habitat. The applicant will ensure that activities that are inconsistent with the maintenance of the suitability of remaining habitat and associated on-site watershed</p>

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SS23	<p>are prohibited. This includes, but is not limited to (i) alteration of existing topography or any other alteration or uses for any purposes, including the exploration for or development of mineral extraction; (ii) placement of any new structures on these parcels; (iii) dumping, burning, and/or burying of rubbish, garbage, or any other wastes or fill materials; (iv) building of any new roads or trails; (v) killing, removal, alteration, or replacement of any existing native vegetation; (vi) placement of storm water drains; (vii) fire protection activities not required to protect existing structures at the project site; and (viii) use of pesticides or other toxic chemicals. In the event that take cannot be avoided, contact the Service for information prior to starting the action.</p> <p><i>Plants</i></p> <p><u>fleshy owl's-clover (<i>Castilleja campestris ssp. succulenta</i>)</u> (T)</p> <p><u>San Joaquin Valley Orcutt grass (<i>Orcuttia inaequalis</i>)</u> (T)</p> <p><u>hairy Orcutt grass (<i>Orcuttia pilosa</i>)</u> (E) *</p> <p>These species may be found in vernal pools and other seasonal wetlands that pond water for three weeks or more are potential habitat for these vernal pool plants. A survey should be conducted to look for vegetation and hydrologic indicators typical of such wetlands. In some instances vernal swales can support these species. Before any ground disturbing activities, have a Service-approved botanist survey for the presence of the soils and plant associations considered habitat for these species.</p>
	<p>Hydrology and Stream Channel</p>
HSC1	Projects will be planned and designed based on geomorphological analysis.
HSC2	Work within active stream channel flows will be minimized, to the extent possible.
HSC3	Streambanks will be contoured appropriately to provide stability.
HSC4	Proposed actions will be designed to be compatible with existing flood control systems and be coordinated with local flood control entities.
HSC5	Proposed actions will comply with established local flood control regulations.
	<p>Socioeconomic Conditions</p>
SC1	Under all land-use agreements, landowners would be monetarily compensated based on real estate appraisals of fair market value and land-use rights acquired, as provided by the Uniform Appraisal Standards for Federal Land Acquisition, 1973. The more

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	rights that are obtained in an easement, the greater the payment to the landowner.
SC2	Land-use rights acquired from landowners would consider the site-specific conservation needs and the land-use needs of the landowner. Only those rights necessary for protection or restoration of habitat would be acquired by the easement.
SC3	<p>Conserving habitat through fee titles may reduce county tax revenue because of potential decreases in market value of conserved land. However, if fee titles are acquired by the Service, the Service would annually reimburse Merced county to offset revenue lost through the Refuge Revenue Sharing Act (Public Law 95-469). This law states that the Secretary of the Interior shall pay out to Merced county the greater of the following amounts:</p> <ul style="list-style-type: none"> a. An amount equal to the product of 75 cents multiplied by the total acreage of that portion of the fee area which is located within such county; or b. An amount equal to three-fourths of one percent of the fair market value, as determined by the Secretary, for that portion of the fee area which is located within such county; or c. An amount equal to 25 percent of the net receipts collected by the Secretary in connection with the operation and management of such fee area during such fiscal year. However, if a fee area is located in two or more counties, the amount for each county shall be proportioned in relationship to the acreage in that county. <p>Congress may appropriate, through the budget process, supplemental funds to compensate local governments for any shortfall in revenue sharing payments. The Act also requires that the Service land be reappraised every 5 years to ensure that payments to local governments remain equitable. Payments under the Refuge Revenue Sharing Act would be made only on lands which the Service acquires through fee purchase, transfer, or donation fee title. On lands where the Service might acquire partial interest through easement, all taxes will remain the responsibility of the individual landowner.</p>
SC4	Local contractors would be hired for the construction activities to the extent practicable to benefit local economies.
SC5	Revegetation plans will incorporate measures to minimize the potential for establishment and spread of noxious weeds. Noxious weeds that may become established will be controlled as necessary.

Code	Avoidance and Conservation Measures
	Air Quality and Noise
AQN1	Construction sites will be watered to control dust. Fume-emitting equipment will not be operated excessively near developed areas.
AQN2	Construction machinery will be equipped for noise suppression using modern mufflers and proper operating conditions. Nearby residents will be contacted prior to project construction. Noisy machinery will be placed as far away from developed areas as possible. Hours of construction will be limited to regular work hours when near developed areas. Machinery will be shut off when not in use.
	Cultural Resources
CR1	Surveys will be conducted by cultural resource specialists prior to construction to identify potential cultural resources, including cultural sites, artifacts, and Indian Trust Assets.
CR2	Proposed projects will comply with applicable cultural resources regulations and acquire appropriate permits or clearance.
CR3	If cultural sites or artifacts are discovered during construction, work will be stopped and a qualified archeologist will be consulted.
	Recreation
R1	Project activities will be limited to weekdays whenever possible and will be completed as soon as possible to minimize temporary impairment of recreational opportunities during construction.
R2	Appropriate signs will be used to warn recreationists of construction activities and potentially hazardous conditions.
R3	Actions involving grading, terracing, or creating structures will be designed to blend into the landscape to every extent possible, and to appear as natural or visually pleasing as possible. Construction sites will be kept clean and orderly.

Code	Avoidance and Conservation Measures
	Hazardous Materials
HM1	The project site will be surveyed and tested for existing hazardous substances by qualified persons and, if present, cleaned up prior to construction. All fill material used will be checked for contaminants, and discarded material and any accidental spills will be removed and disposed of at an approved site.
HM2	Chemical pesticide and fertilizer use will be consistent with environmentally beneficial objectives of the actions.
HM3	A written contingency plan will be developed for all project sites where hazardous materials (e.g., pesticides, herbicides, and petroleum products) will be used or stored. Appropriate materials and supplies (e.g., shovel, disposal containers, absorbent materials, first aid supplies, and clean water) will be available on site to cleanup any small scale accidental hazardous spill. Hazardous spills will be reported to State and Federal authorities.
HM4	Treatments for the control or removal of invasive plants in riparian/wetland areas must be limited to hand or wick applications by qualified personnel.
HM5	Apply chemicals during calm, dry weather and maintain unsprayed buffer areas near aquatic habitats and other sensitive areas.
HM6	Chemical applications must be avoided where seasonal precipitation or excess irrigation water is likely to wash residual toxic substances into waterways.
	Access, Roads, and Traffic
ART1	Whenever possible, existing roads will be used to access project sites . Access agreements will be established with landowners as needed. Access to project sites will be clearly marked to avoid accidental trespass or damage to land cover.
ART2	Limitations will be placed on frequency and total amount of construction traffic, and appropriate speed limits will be set to reduce dust hazards and potential for accidents. Vehicle and heavy equipment speed within construction area will be safely limited.
ART3	Unless maintenance or monitoring access is required, only temporary roads will be constructed. Temporary roads will be built with as little damage as possible to the land cover using careful routing and proper surface materials, such as wood chips. Sensitive root zones and vegetated areas will be fenced-off from roaded areas.

Code	Avoidance and Conservation Measures
ART4	Temporary roads will be removed upon completion of the project and vegetation and habitats restored.
ART5	Temporary roads that have been severely compacted will be tilled to promote vegetation establishment and growth.
ART6	Access roads will be improved or built suitably for heavy equipment, multiple haul loads, and materials being transported. Loads will be covered, as needed, for trucks transporting material off-site.

Mitigation measures from the Department of Fish and Game for Swainson's Hawks

These avoidance and conservation measures will be followed if Swainson's hawks are found during pre-construction surveys.

Recommended Management Conditions are:

1. No intensive new disturbances (e.g. heavy equipment operation associated with construction, use of cranes or draglines, new rock crushing activities) or other project related activities which may cause nest abandonment or forced fledging, should be initiated within ¼ mile (buffer zone) of an active nest between March 1 – September 15 or until August 15 if a Management Authorization or Biological Opinion is obtained for the project. The buffer zone should be increased to ½ mile in nesting areas away from urban development (i.e. in areas where disturbance [e.g. heavy equipment operation associated with construction, use of cranes or draglines, new rock crushing activities] is not a normal occurrence during the nesting season).

Nest trees should not be removed unless there is no feasible way of avoiding it. If a nest tree must be removed, a Management Authorization (including conditions to off-set the loss of the nest tree) must be obtained with the tree removal period specified in the Management Authorization, generally between October 1 – February 1. If construction or other project related activities which may cause nest abandonment or forced fledging are necessary within the buffer zone, monitoring of the nest site (funded by the project sponsor) by a qualified biologist (to determine if the nest is abandoned) should be required. If it is abandoned and if the nestlings are still alive, the project sponsor shall fund the recovery and hacking (controlled release of captive reared young) of the nestling(s). Routine disturbances such as agricultural activities, commuter traffic, and routine facility maintenance activities within ¼ mile of an active nest should not be prohibited.

2. Hacking as a substitute for avoidance of impacts during the nesting period may be used in unusual circumstances after review and approval of a hacking plan by ESD and WMD. Proponents who propose using hacking will be required to fund the full costs of the effort, including any telemetry work specified by the Department.

3. To mitigate for the loss of foraging habitat (as specified in this document), the Management Authorization holder/project sponsor shall provide Habitat Management (HM) lands to the Department based on the following ratios:

- a) Projects within 1 mile of an active nest tree shall provide:

- one acre of HM land (at least 10%) of the HM land requirements shall be met by fee title acquisition or a conservation easement allowing for the

Appendix J

active management of the habitat, with the remaining 90% of the HM lands protected by a conservation easement [acceptable to the Department] on agricultural lands or other suitable habitats which provide foraging habitat for Swainson's hawk) for each acre of development authorized (1:1 ratio);

- or -

one-half acre of HM land (all of the HM land requirements shall be met by fee title acquisition or a conservation easement [acceptable to the Department] which allows for the active management of the habitat for prey production on the HM lands) for each acre of development authorized (0.5:1 ratio).

b) Projects within 5 miles of an active nest tree but greater than 1 mile from the nest tree shall provide 0.75 acres of HM land for each acre of urban development authorized (0.75:1 ratio). All HM lands protected under this requirement may be protected through fee title acquisition or conservation easement (acceptable to the Department) on agricultural lands or other suitable habitats which provide foraging habitat for Swainson's hawk.

c) Projects within 10 miles of an active nest tree but greater than 5 miles from an active nest tree shall provide 0.5 acres of HM land for each acre of urban development authorized (0.5:1 ratio). All HM lands protected under this requirement may be protected through fee title acquisition or a conservation easement (acceptable to the Department) on agricultural lands or other suitable habitats which provide foraging habitat for Swainson's hawk.

4. Management Authorization holders/project sponsors shall provide for the long-term management of the HM lands by funding a management endowment (the interest on which shall be used for managing the HM lands) at the rate of \$400 per HM land acre (adjusted annually for inflation and varying interest rates).

Appendix K

Fish and Wildlife Coordination Act Compliance



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

IN REPLY REFER TO:

February 28, 2001

Memorandum

To: Scott Spaulding, Habitat Restoration Coordinator, Anadromous Fish Restoration Program, Stockton, California

From: Acting Field Supervisor, Sacramento Fish and Wildlife Office
Sacramento, California

Subject: Fish and Wildlife Coordination Act Report on the Merced River Salmon Habitat Enhancement Project and the Robinson Reach Phase

This memorandum constitutes the U.S. Fish and Wildlife Service's (Service) Fish and Wildlife Coordination Act (FWCA) report, as provided for in section 2(b) of the FWCA (Public Law 85-624; 16 U.S.C. 661-667e), regarding Service, California Department of Fish and Game (CDFG) and California Department of Water Resources implementation of the Merced River Salmon Habitat Enhancement Project, and specifically its Robinson Reach Phase. The Merced River Salmon Habitat Enhancement project is designed to restore the Merced River between river miles 40.0 and 44.4. The Project, constructed in four phases over several years, will use identical methodologies to ensure that each phase is compatible and the overall enhancement project functions as a whole. The Robinson Reach phase of the overall project, located on the Merced River between river miles 42.1 and 44.4, would modify approximately 12,200 linear feet of channel to create 21,900 square yards of spawning habitat; incorporate spawning riffles, runs, and pools; and would establish a meander that fits the current flow regime.

The Merced River Salmon Habitat Enhancement Project, and specifically its Robinson Reach Phase, would be partially funded by the Anadromous Fish Restoration Program (AFRP) which is authorized under section 3406(b)(1) of the Central Valley Project Improvement Act. The AFRP's goal is to "... implement a program that makes all reasonable efforts to ensure, that by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991."

The FWCA requires consultation with the Service and provision of reports and recommendations to any Federal agency responsible for engineering surveys and construction of projects when any water body is impounded, diverted, controlled, or modified for any purpose. These Federal agencies shall give full consideration to the aforementioned report and recommendations and to any report of the State agency, and the project plan shall include such justifiable means and measures for wildlife purposes as the reporting agency finds should be adopted to obtain maximum overall project benefits. The Service may incorporate the concerns and findings of the

State agencies and other Federal agencies, including the National Marine Fisheries Service (NMFS), into our report addressing fish and wildlife concerns.

Since the Service is the Federal lead agency for implementing this action, we have focused analysis in the California Environmental Quality Act/National Environmental Policy Act process and documentation to meet our need for adequate surveys and investigations as outlined in the FWCA. Based on the following, we find no need to provide additional recommendations:

- existing Service recommendations to prevent loss or damage to, and provide for development and improvement of, fish and wildlife resources were incorporated adequately in the associated Initial Study/Environmental Assessment (IS/EA);
- Service mitigation and compensation recommendations were outlined and adopted appropriately in the associated IS/EA;
- the NMFS concurred with the Service's determination of "not likely to adversely affect" for listed species or their designated critical habitat associated with the Merced River Salmon Habitat Enhancement Project based on its programmatic nature, implementation of adequate conservation measures, and commitment to consult when project-specific information is known;
- section 7 consultation under the Endangered Species Act, as amended (ESA), for implementing the Robinson Reach Phase of the Merced River Salmon Habitat Enhancement Project concluded with a determination of no jeopardy from the Service based on commitments to uphold the ESA and meet assumptions of the effects analysis in the associated biological opinion (1-1-01-F-0024), and a concurrence of not likely to adversely affect listed species or their designated critical habitat from NMFS;
- future coordination under the FWCA will be completed, as necessary, for actions tiered from the associated IS/EA document.

This memorandum has been informally coordinated with CDFG and the NMFS. If formal comments are received from CDFG or NMFS that differ from previous agency input or if the project changes in a way that adversely affects fish and wildlife resources to an extent not previously analyzed, additional mitigation recommendations will be forthcoming.

If you have any questions regarding this report or other aspects of the FWCA, please call Ryan Olah or Mike Hoover of my staff at (916) 414-6550.

Doug Wennich

for Dale A. Pierce

cc: CDFG, Region 4, Fresno, CA (Attn: Rhonda Reed)
NMFS, Sacramento, CA (Attn: Bruce Oppenheim)

Appendix L

Public Comments and Agency Responses

FEB 26 2001
SACRAMENTO
FISH & WILDLIFE OFFICE

February 23, 2001

Mr. Bill Lauder milk, Regional Manager
San Joaquin Valley and Southern Sierra Region
California Department of Fish and Game
1234 East Shaw Avenue
Fresno, CA 93710

Mr. Fred Jurick, Staff
San Joaquin Valley and Southern Sierra Region
California Department of Fish and Game
1234 East Shaw Avenue
Fresno, CA 93710

Re: Merced River Salmon Habitat Enhancement Project; Phase III (Robinson Reach);
Draft Initial Study and Proposed Negative Declaration; California Department of Fish
and Game; Comments by Bob Baiocchi, Interested Party

Dear Gentlemen:

I have reviewed a copy of the Draft Initial Study and Environmental Assessment
for the Merced River Salmon Habitat Enhancement Project, Phase III (Robinson
Reach), dated January 24, 2001. The deadline period for submitting comments is
February 26, 2001. The enclosed written comments are timely.

I am no longer the consultant for the California Sportfishing Protection Alliance.
However, I am still consulting. Consequently the following are the comments of
Bob Baiocchi, Interested Party, at this time.

In my opinion the Chinook salmon species and steelhead species and their habitat
of the Merced River Watershed has been significantly degraded by the operations
of the New Exchequer Project and other proposed and existing diversions by the
Merced Irrigation District and other parties on the Merced River. It is also my
understanding that the spring-run Chinook salmon runs in the Merced River have
been extinguished by the operation of the New Exchequer Dam and Reservoir by
the Merced Irrigation District.

The Central Valley steelhead species and also the spring-run Chinook salmon
species have been listed and are protected by the provisions of the federal
Endangered Species Act.

In reviewing the Initial Study and Negative Declaration I found that the hydrology
analysis is deficient, including the water quality analysis. Salmon habitat is
needed, but the central issue is the amount of daily water that flows through the
salmon restoration habitat area of the Robinson River reach. e.g. wet, above
normal, normal, below, dry, and critical dry water years.

Regardless of the amount of salmon habitat area that is restored and improved by the Department and the U.S. Fish and Wildlife Service for this project, the available amount of spawning and rearing habitat for salmon based on flows and water temperatures is critical to determine the success of the habitat improvement work for Chinook salmon species (all life stages) at the Robinson reach of the Merced River.

The Initial Study should be amended to include an analysis of daily flows in the Robinson river reach for all water year types, including whether daily flows are sufficient to protect improved salmon spawning and rearing habitat. The Negative Declaration should be amended to mitigate for those effects.

The Initial Study should also be amended to include an analysis of daily water temperatures in the Robinson river reach for all water year types, including whether daily water temperatures are sufficient to protect salmon spawning and rearing habitat. The Negative Declaration should be amended to mitigate for those effects.

The Initial Study shows the Department did not consult with the U.S. National Marine Fisheries Service concerning their recommendations to protect steelhead species and their habitat resulting from the salmon habitat improvement project. As you are aware, the steelhead species of the Central Valley have been listed for protection as threatened under the provisions of the federal Endangered Species Act. At least one threatened steelhead species in the Merced River was cited in the Initial Study. There may be more steelhead species in the Merced River.

Flows and water temperatures in the Merced River are a result of the operations of New Exchequer Dam and Reservoir. Consequently, there is a federal nexus because the New Exchequer Dam and Reservoir is licensed with the Federal Energy Regulatory Commission.

Because of the lack of consultation with the U.S. National Marine Fisheries Service concerning the effects to steelhead species and their habitat resulting from the proposed project, the Initial Study should be amended to disclose and evaluate this information.


I recommend the Department conduct an extensive monitoring program in the Merced River to determine whether threatened steelhead have migrated into the Merced River unnoticed by the Department.

Public money from the Delta Pumping Plant Four Pumps Agreement, the USFWS Services' Anadromous Fish Restoration Program, and the USBR's and DFG's Tracy Fish Facility Direct Diversion Mitigation Program will be used for the proposed salmon improvement project. There is the potential that the recruitment of salmon spawning gravel may have been adversely effected by the construction of New Exchequer Dam.

The Initial Study should be amended to disclose whether the downstream recruitment of spawning gravel was caused by the New Exchequer Dam, and whether the Merced Irrigation District has a duty and responsibility to also fund any and all salmon spawning improvement projects in the Merced River.

Thank you for the opportunity to provide the Department with comments from an interested party and a California licensed angler.

Respectfully Submitted

A handwritten signature in cursive script that reads "Bob Baiocchi". The signature is written in dark ink and is positioned above a horizontal line.

Bob Baiocchi, Consultant, Interested Party
P.O. Box 1790
Graeagle, CA 96103

Cc: Mr. Dale Pierce, Acting Field Supervisor
U.S. Fish and Wildlife Service
2800 Cottage Way – Room W-2605
Sacramento, CA 95825

Mr. Jim Bybee, Supervisor
U.S. National Marine Fisheries Service
777 Sonoma Avenue – Room 325
Santa Rosa, CA 95404

Interested Parties

Response to comments received from Mr. Bob Baiocchi

Note that parenthetical references in Comment topic line refer to the comment letter. Parenthetical references in the Response sections refer to the IS/EA.

Comment: Hydrology analysis and water quality analysis are deficient (paragraph 5, 6, and 7)

Response: One of the basic definitions of this project is to create non-flow related improvement in chinook salmon production (IS/EA page 5). This acknowledges that existing agreements, water rights and permitted activities (such as FERC operational licenses for New Exchequer Dam) presently establish a hydrologic pattern for the river. The channel and floodplain design of the project are scaled to improve habitat function based on the present permitted hydrological regime. Section 6.1.3.2. (page 13) identifies how these principles are applied in the proposed Robinson Reach phase. For more specific design and analysis detail we referred to the publication: Merced River Robinson/Gallo Project – Ratzlaff Reach (DWR, 2000).

Comment: Success of the habitat improvement is dependent on flow and water temperature (paragraph 6).

Response: We agree with this premise. Additional pre- and post-project habitat modeling is being done at the Robinson Reach phase using PHABSIM-2d methodology to measure the incremental change in habitat benefit. This study is described at the following web address: http://www.delta.dfg.ca.gov/afrr/template_frame.asp?code=00%20L%20D-9.

Comment: Daily flows should be analyzed to determine that flows are sufficient to protect improved habitat and, if not, mitigation should be identified (paragraph 7).

Response: Prior to 1997 and under the present flow regime from New Exchequer, California Department of Fish and Game (DFG) biologists estimated that 15 to 25% of the annual Merced River natural spawning occurred in the Robinson Reach (page 11). The flood event of 1997 caused the river to abandon the natural channel making unavailable the suitable spawning material. Additional habitat degradation has occurred throughout this reach which has eliminated spawning riffles, created habitat for non-native salmon predators, and has resulted in passage problems and reduced survival of adult and juvenile salmon. These observations identify that the existing flows have supported salmon spawning and production in this reach and likely will again, if degraded habitat is restored.

The DFG agrees that instream flow is a critical consideration for salmon populations. However, modification of the current flow regime is outside the scope of the proposed action. Nonetheless, the floodplain and channel enhancements proposed in this action will not preclude increases in releases from New Exchequer Dam, should they be negotiated in the future.

Comment: Daily water temperatures should be monitored and mitigation identified (paragraph 8).

Response: As a part of the fish monitoring plan (Appendix D) water temperatures throughout the project will be monitored, on a continuous basis, before construction and for 5-10 years after completion of all the phases. The expected effect of the project is an overall reduction in temperature owing to re-establishment of shaded riverine habitat and reduction of slow-moving shallows. This is a desired result and mitigation would not be required.

Comment: No consultation with U.S. National Marine Fisheries Service (NMFS) (paragraph 9 and 11).

Response: The US Fish and Wildlife Service has requested NMFS to consult on this project and a formal letter of concurrence has been issued.

Comment: Federal nexus to New Exchequer Dam (paragraph 10).

Response: The proposed Federal action being assessed by this IS/EA is the implementation of the Merced River Salmon Habitat Enhancement Project through funding by a Federal agency.

Comment: Recommendation that DFG conduct steelhead monitoring (paragraph 12).

Response: The DFG appreciates the recommendation that steelhead monitoring be conducted on the Merced River. However, such studies are outside the purposes of the proposed action and monitoring plan.

Comment: The initial study should determine if Merced Irrigation District (MID) is responsible for funding the proposed action (paragraphs 13 and 14).

Response: The funds to implement the proposed restoration actions are committed from a variety of sources. Some are derived from mitigation agreements resulting from impacts to the species in another location. Some are derived from more diverse public

appropriations which acknowledge that our problem of declining salmon populations has resulted from multiple and cumulative past actions, and resolution of the problem will be more quickly served by actions today than by complex litigation to seek guilty parties. MID has been an active partner in the proposed project by operation of the rotary screw trap station at the downstream end of the project area. This activity supports a portion of the fish monitoring program. The DFG shares Mr. Baoicchi's interest in increasing MID's involvement in salmon restoration actions.

Appendix M

Access Agreement

ROBINSON CATTLE COMPANY**Christopher Robinson**
General Partner

March 5, 2001

P.O. BOX 10 • MERCED, CALIFORNIA 95341-0010

OFFICE (209) 722-2502

FAX (209) 722-2261

To: Mike Hoover, USFWS

Robinson Cattle Company agrees to provide access to the United States Fish and Wildlife Service, the California Department of Fish and Game, and the California Department of Water Resources and their designated agents for the purpose of transplanting elderberry shrubs (*Sambucus mexicana*) from the construction area proposed under the Merced River Salmon Habitat Enhancement Project (Robinson Reach Phase) to a location where they will not be affected by said construction activities. The location where the elderberry shrubs will be transplanted to consists of approximately 5.3 acres of habitat on the southern bluff adjacent to the project area (see map). Robinson Cattle Company intends to execute a permanent conservation easement on approximately 310 acres which includes this transplantation area. The ~~Agreement~~^{easement} will execute immediately following the Wildlife Conservation Board meeting granting approval for said easement in May of 2001. The conservation easement will protect the planted area in perpetuity and is currently being negotiated with the California Wildlife Conservation Board with the assistance of the Department of Fish and Game, the Department of Water Resources, and The Nature Conservancy.

The State of California, in accepting this access letter agrees that it will repair and restore or pay the cost of repairing and restoring any property damaged as a result of work done by the state. Further, the state will indemnify and save harmless Robinson Cattle Company and its agents, successors, heirs, assigns and employees from any loss of or damage to the property by the state.

Attachment:

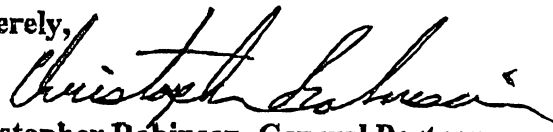
Map shows an area defined by two lines:

1) Southerly line includes reference point numbers 232 through 247 inclusive on the DWR Division of Lands and Right-of-Way map and is approximately 2000 feet in length

2) Northerly line runs parallel to the southerly line offset 115 feet to the north.

Note: The area described is roughly rectangular in shape and approximately 5.3 acres in size.

Sincerely,



Christopher Robinson, General Partner